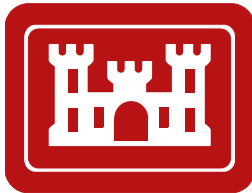


TARGETED BROWNFIELDS ASSESSMENT PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT

BELLFORT LANDFILL
HOUSTON, TEXAS

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Prepared for:



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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
bgs	below ground surface
COC	chain-of-custody
DOT	department of transportation
EM	engineer manual
EPA	United States Environmental Protection Agency
ESA	Environmental Site Assessment
ESI	Environmental Site Investigation
HSA	hollow stem auger
ICP	Inductively Coupled Plasma
IDW	investigative derived waste
kg	kilogram
LEL	lower explosive limit
mg	milligram
MS	matrix spike
MSD	matrix spike duplicate
PCL	Protective Concentration Level
PPE	personal protective equipment
PPM	parts per million
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
SEE	Stell Environmental Enterprises, Inc.
SOW	Scope of work
SVOCs	semivolatile organic compounds
TAL	total analyte list
TCL	target compound list
TBA	Targeted Brownfields Assessment
TCLP	Toxicity Characteristic Leaching Procedure
Terracon	Terracon Consultants, Inc.
TPH	Total Petroleum Hydrocarbon
TRRP	Texas Risk Reduction Program
U.S.	United States

USACE	United States Army Corps of Engineers
VOCs	volatile organic compounds
Work Plan	Phase II Environmental Site Assessment Work Plan and Quality Assurance Project Plan

1.0 INTRODUCTION

This Phase II Environmental Site Assessment (ESA) Report describes the results of the field investigation that was conducted during June through July of 2010 at the former Bellfort Landfill (Site), located in Houston, Texas (Figure 1). The City of Houston would like to redevelop the site for possible park space, a botanic garden, and a solar plant facility. Stell Environmental Enterprises, Inc., (SEE) of Elverson, Pennsylvania, performed this field investigation under United States (U.S.) Army Corps of Engineers (USACE), Fort Worth District Contract No. W9126G-06-D-0037, Delivery Order No. 0024. The Phase II ESA was performed in accordance with the detailed Statement of Work (SOW) issued by the USACE dated November 25, 2009 and the Phase II Environmental Site Assessment Work Plan and Quality Assurance Project Plan (Work Plan) developed by SEE (SEE 2010).

This ESA was funded by the U.S. Environmental Protection Agency (EPA) Region 6 Targeted Brownfields Assessment (TBA) program. EPA tasked USACE Fort Worth District with providing the ESA in response to a TBA assistance request from the City of Houston.

1.1 SITE LOCATION AND DESCRIPTION

The former landfill is 299.5 acres in size and is located approximately 7 miles south of Houston, Texas, in Harris County. The Site is bounded to the north by Bellfort Avenue, to the east by Comal Street, to the south by Reed Road, and to the west by Texas Route 288 (Figure 1).

Currently, the Site contains a mixture of overgrown grass areas and wooded areas consisting primarily of scrub brush. A few former roads, which were used in past investigations of the Site, traverse the property. A former incinerator was located in the northwestern section of the Site. Johnson Public Library is located in the southeastern corner of the site. Adjacent to the northeastern corner of the site is Sunnyside Public Park, which has ball fields, tennis courts, and an in ground public swimming pool. A channelized unnamed tributary to the San Jacinto River flows north to south along the western boundary of the Site.

Surface water is the primary water supply source for Harris County and the City of Houston. Surface water accounts for 71% of the city of Houston's water supply. Groundwater accounts for the remaining 29% of its water supply. The City of Houston supplies potable water to the surrounding developed properties.

The soils in the Bellfort Landfill project area consist of clays to silty clays. The soils are very deep and poorly drained. The Beaumont Formation, which consists of a very deep, poorly drained soil located in the low uplands, underlies the site. This formation consists of clay sediments that were deposited during the Pleistocene Age.

Harris County has a moist, subhumid climate, with hot summers and mild winters. Temperatures range from an average low of 42 degrees Fahrenheit (°F) in January to an average high of 92°F in July and August. Rainfall averages a little more than 51 inches per year, with the highest rainfall occurring in May through July.

1.2 SITE HISTORY

The City of Houston purchased the property in 1937 and used the Site mostly as a landfill with an incinerator located in its northwestern corner. The landfill closed in 1970 and the incinerator closed in 1971. From 1970 through 1977, soil and demolition debris were disposed of at the site. During the mid 1970s, the City of Houston added approximately 2 million cubic yards of soil to the landfill cover. The site currently is not being used.

1.3 PAST INVESTIGATIONS

In the late 1970s, EMCON was hired to study the feasibility of building an 18-hole golf course on the property. The study included drilling and sampling 16 soil borings, measuring landfill gas, and installing three groundwater monitoring wells. The study concluded that constructing a golf course was technically feasible; however, cost considerations postponed its development.

Terracon Consultants, Inc., (Terracon) conducted a limited Environmental Site Investigation (ESI) of the Site during the fall of 2004. The purposes of the ESI were to preliminarily evaluate the presence of landfill gas, determine if groundwater has been impacted, and explore geotechnical subsurface conditions beneath the landfill. The investigation included the installation of six landfill gas monitoring wells, five groundwater monitoring wells, and two geotechnical borings. The investigation discovered that the waste was still generating methane gas. No volatile organic compounds (VOCs) were detected at concentrations above the Texas Risk Reduction Program (TRRP) critical protection levels in the groundwater samples collected from the groundwater monitoring wells. Arsenic and selenium were detected at concentrations greater than the TRRP assessment levels in groundwater samples collected from two of the monitoring wells. Terracon concluded that additional monitoring at the gas monitoring wells was not necessary; however, they recommended that the gas monitoring wells remain in place for possible future monitoring (Terracon, 2004).

Terracon conducted a supplemental limited site investigation in September 2005. The objective of this work was to investigate the subsurface conditions within the landfill for the presence of municipal solid waste, ash associated with the former incinerator, and landfill gas. The investigation included the completion of 11 soil borings, of which three were converted into landfill gas monitoring wells, and the plugging and abandoning of five existing groundwater monitoring wells. The investigation discovered the site did not have sufficient “uniform” soil cover for redevelopment. There appeared to be very little incinerator ash present in the study area. There were concentrations of Resource Conservation and Recovery Act (RCRA) metals detected in the near surface soil; however, the metals concentrations were below respective TRRP critical protection levels (Terracon, 2005).

1.4 SCOPE OF INVESTIGATION

The Phase II ESA was conducted to further determine the thickness of the waste, determine the nature of landfill cap material, characterize incinerator ash, and evaluate potential groundwater impacts. The scope of the field activities that were conducted included drilling 26 subsurface borings, collection of 10 surface and shallow subsurface soil samples, installation of four temporary monitoring wells, groundwater sampling, and laboratory analysis of the 10 soil and four groundwater samples collected.

2.0 FIELD OPERATIONS

The Phase II ESA investigation was conducted over the course of two field events in June 2010 and July 2010. During the first field event the following activities took place:

- Four temporary monitoring wells were installed;
- Seven soil borings were drilled to determine the thickness of the cap and municipal waste;
- Nineteen soil borings were drilled to determine the thickness of the cap; and
- Ten surface soil samples were collected to investigate the potential disposal of ash from the former incinerator located on site.

The second field event included sampling of the four monitoring wells to determine site wide groundwater conditions. The following sections present a detailed description of the field operations.

2.1 DETERMINATION OF WASTE AND CAP THICKNESS

A certified drilling contractor licensed in the state of Texas drilled seven borings to determine the waste and cap thickness in areas lacking data from previous investigations. The locations of the borings were based on guidance from the EPA. The borings were located in the field based on field conditions and physical access (Figure 2).

The boreholes were advanced through unconsolidated material using hollow stem auger (HSA) methods and 6¼-inch inside diameter augers. In conjunction with HSA drilling, continuous split barrel sampling and standard penetration tests were conducted. Since the area was overgrown, a Geoprobe[®] mounted on a tractor was used in areas where the drill rig could not get to. A split-spoon or MacroCore sampler was employed to obtain the soil to be sampled for the Geoprobe[®] borings using direct push technology. The borings extended to a depth of 5 feet below the base of the waste material. Waste borings that did not encounter any waste were terminated after ten feet according to the Work Plan. Continuous samples were collected from these borings to provide data regarding the description of the cap, waste, and soil below the waste. A geologist logged the borings on Engineering Form 1836 and 1836-A following the methods outlined in Engineer Manual (EM) 1110-1-4000 (USACE, 1998). None of the samples collected were submitted for laboratory analysis.

Nineteen soil borings were drilled to determine the landfill cap thickness and material using HSA and Geoprobe[®] direct push technology methods as described above. These borings were completed to a depth of 10 feet. Continuous samples were collected to provide data regarding the description of the cap and waste. Boring logs were completed as described above. The ambient levels of methane were monitored during all drilling activities. The monitoring results were recorded.

Soil cuttings from the waste and cap thickness investigation were collected, containerized, and managed as investigation-derived waste (IDW) as discussed in Section 2.8.

2.2 CHARACTERIZATION OF INCINERATOR ASH

Ten surface soil samples were collected to investigate the potential disposal of ash from the former incinerator that was located on site (Figure 2). A disposable trowel was used to collect the surface soil samples. Soil retrieved with the trowel was placed in a stainless steel bowl and homogenized. Individual sample containers were filled with the homogenized soil.

Collected samples were placed in laboratory-provided sample containers, sealed, labeled, and placed in a cooler chilled to 4 degrees Celsius for subsequent submittal to the laboratory for analysis.

Chain-of-custody (COC) forms supplied by the analytical laboratory were used to track all samples collected at the site. The COC forms were completed at the same time the environmental samples were collected and identified the sampling personnel, sample time, location, and analyses required. The COC forms accompanied the samples at all times, from the time of sample collection to the time the samples were received by the analytical laboratory.

The laboratory analytical procedures used are discussed in Section 2.9.

2.3 MONITORING WELL INSTALLATION

Four temporary monitoring wells were installed outside of the waste boundary along the four sides of the property to investigate the presence/absence of shallow groundwater contamination on a site-wide basis. Monitoring well MW-2R is located adjacent to former location of MW-2, and MW-4R is located adjacent to former location of MW-4 to duplicate the wells where previous Target Analyte List (TAL) metals were detected. The other two wells, MW-6 and MW-7, are located along the western and northern boundaries of the property, respectively, as requested by EPA personnel. The location of the monitoring wells is presented on Figure 2.

Monitoring well design, installation, and documentation generally followed the methods outlined in EM 1110-1-4000 (USACE, 1998). The four monitoring well boreholes were drilled using HSA methods as described above. Boreholes were advanced through unconsolidated material using 6¼-inch inside diameter augers. In conjunction with HSA drilling, continuous split barrel sampling and standard penetration tests was conducted. Drilling continued to a depth of 5 feet below the first groundwater interval encountered.

The monitoring wells were constructed using flush-threaded Schedule 40, 2-inch diameter polyvinyl chloride (PVC) casing and screen and were equipped with a solid PVC bottom cap. The monitoring wells were constructed with 0.010 slot screens that are 10 feet in length. The well screens were positioned to intersect the groundwater table. The sand pack consisted of 45 minimum grade (mesh) size sand and were installed from the base of the boring to approximately 3 feet above the top of the screen. Approximately 3 feet of bentonite was placed above the sand pack as a surface seal. The remainder of the borehole to the ground surface was filled with grout.

An 8-inch diameter protective stick-up steel casing was installed over the top of the PVC riser and extended approximately 2.5 feet above the ground surface. The protective casing, equipped with a hinged protective cap and padlock, was secured in the grout placed around the wellhead.

The geologist overseeing the sampling and drilling operation recorded a description of the drilling and sampling activities associated with each location. A USACE-approved boring log was filled out for each completed well.

All soil cuttings from the monitoring well installation were collected, containerized, and managed as IDW as discussed in Section 2.8.

2.4 MONITORING WELL DEVELOPMENT

The newly installed wells were developed two weeks after well installation. Development was accomplished by surging the well and pumping the groundwater with a decontaminated pump or by hand bailing. Once initiated, development proceeded until the following conditions were met:

- The well water was clear to the unaided eye.
- A minimum of three borehole volumes was removed from the well.
- Monitoring parameters (pH, temperature, and specific conductivity) stabilized.

Monitoring well purge water was collected, containerized, and managed as IDW as discussed in Section 2.8.

2.5 GROUNDWATER SAMPLING

During the field event in July 2010, the four monitoring wells were purged and sampled to investigate site-wide ground water conditions. The low flow sampling technique was used to sample the wells. The procedures were developed in consideration of EPA Region I guidance document dated July 30, 1996 (EPA, 1996).

2.5.1 WELL STABILIZATION

A submersible pump equipped with a flow controller was used to purge the monitoring wells prior to sampling. The wells were purged at a rate of 0.5 gallons per minute or less. Before the samples could be collected the water in the well had to come to stabilization. During the pumping of the well the pH, conductivity, turbidity, dissolved oxygen, and temperature of discharge water was monitored with measurements being made once every five minutes. Once stabilized (three consecutive readings of pH within 0.1 unit, specific conductance within 3 percent, turbidity within 10%, dissolved oxygen within 10%, and temperature within 1 °C), the well was considered to be sufficiently purged. Temperature, pH, turbidity, and conductivity values obtained during well purging were recorded in low flow sampling field logs located in Appendix C.

Well MW-06 could not be sampled by low flow purging methods because it is located in the middle of a swampy area which was inaccessible by the vehicle required to operate the pump. Three well volumes were evacuated from this well using a bailer prior to groundwater sampling. These variations to the Work Plan were noted on the sampling forms.

2.5.2 SAMPLING

Sampling began once the water quality parameters stabilized. One groundwater sample was collected from each monitoring well and submitted to TestAmerica, Inc., and analyzed for Target Compound List (TCL) VOCs, TCL semivolatile organic compounds (SVOCs), and total and dissolved TAL metals. The fraction of each groundwater sample collected for dissolved TAL metals analysis was field filtered using an in-line 0.45-micron filter. Groundwater samples were collected using a dedicated disposable bailer at each well. Collected groundwater samples were handled as discussed in Section 2.3. The laboratory analytical procedures used are discussed in Section 2.9.

Monitoring well purge water was collected, containerized, and managed as IDW as discussed in Section 2.8.

2.6 DECONTAMINATION

Prior to beginning any sampling or drilling operations and between each sample/well location, the drill rig and sampling tools were cleaned with potable water. This activity was performed over a temporary decontamination pad, which was constructed prior to commencement of work. After decontamination, tools and drilling equipment were kept on the drill rig resting on clean plastic sheeting to prevent recontamination while moving to the next location.

Submersible pumps used to purge groundwater from wells for development or collection of groundwater samples were decontaminated prior to use. Similarly, all drilling samplers, groundwater, and soil sampling equipment that is not disposable was decontaminated using a sequence of scrubbing, washing with nonphosphate detergent and tap water, and multiple rinses.

2.7 QUALITY CONTROL

Three types of quality assurance/quality control (QA/QC) samples were collected during this investigation: trip blanks, duplicate samples, and matrix spike and matrix spike duplicate (MS/MSD) samples. Equipment rinse blanks were not collected for either matrix because disposable sampling equipment was used to collect the samples.

Trip blanks were collected to ensure VOCs were not introduced to the sample bottles during transport. Trip blanks were collected at a frequency of one sample per cooler of samples to be analyzed for VOCs. Trip blanks were analyzed for VOCs.

Duplicate samples were collected to evaluate the reproducibility of the field sampling and laboratory analysis. One duplicate sample was collected for every ten environmental samples. Duplicate samples were analyzed for the same parameters as the associated environmental samples.

One MS/MSD sample was analyzed for each investigation media sampled. MS and MSD samples were identified clearly as such to the analytical laboratory. MS/MSD samples were analyzed for the same parameters as the associated environmental samples.

Laboratory data was validated according to the procedures outlined in the following guidelines:

- *Modifications to the National Functional Guidelines for Organics Data Review; and, USEPA Region III, 1999.*
- *Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, USEPA-540-R-10-011, USEPA January 2010.*

The data validation included the following:

- Completeness of results and supporting data;
- Sample custody, condition upon receipt, and sample preservation;
- Holding times;
- Field and laboratory blank contamination;
- Inductively Coupled Plasma (ICP) interference check sample results;
- MS/MSD recoveries and reproducibility
- QC non-conformances;
- Duplicate sample results; and
- Data qualifiers were added to all laboratory results.

2.8 *MANAGEMENT OF IDW*

The proposed field investigation generated soil cuttings, monitoring well purge and decontamination water, and used personal protective equipment (PPE). All drill cuttings and drill fluid generated during the investigation activities were placed in U.S. Department of Transportation (DOT)–approved 55-gallon drums, which were stored at a designated location. All groundwater generated during the investigation activities also was placed in DOT-approved 55-gallon drums. The drums were labeled as nonhazardous waste. Sixteen IDW soil drums and five IDW water drums were disposed of off site by CKG Services, 10615 FM 1484, Conroe, TX. The IDW was disposed of as Class 1- Non-hazardous. The used PPE was collected, properly bagged, and disposed of in a municipal trash dumpster.

2.9 *LABORATORY ANALYTICAL PROCEDURES*

The following subsections present the analytical program for the Phase II ESA. All soil and liquid samples (including IDW samples) collected during the Phase II ESA were analyzed by TestAmerica, Inc. of Denver, Colorado. This TestAmerica, Inc lab is compliant with the most recently published version of the DOD Quality Systems Manual and has current National Environmental Laboratory Accreditation Program certification.

2.9.1 *SOIL SAMPLES*

A total of 12 soil samples (10 investigation, 1 duplicate, and 1 MS/MSD) were collected for chemical analysis. The collected soil samples were analyzed for the following:

- RCRA metals using EPA Methods 6010B/7471A.

2.9.2 *GROUNDWATER SAMPLES*

A total of 6 groundwater samples (4 investigation, 1 duplicate, and 1 MS/MSD) were collected for chemical analysis. The collected groundwater samples were analyzed for the following:

- VOCs using EPA Method 8260B;
- SVOCs using EPA Method 8270C; and
- TAL Metals (Total and Dissolved) using EPA Methods 6010B/7470A.

2.9.3 *IDW SAMPLES*

Soil and liquid IDW samples were analyzed for the following waste profile parameters:

- BTEX using Methods 8260B/DOD;
- Toxicity Characteristic Leaching Procedure (TCLP) RCRA metals using EPA Methods 1311/6010B/7471A for soil and EPA Methods 1311/6010B/7470A for liquid; and
- Total Petroleum Hydrocarbons (TPH) using Method TX 1005.

2.10 *SURVEYING*

Soil sample, soil boring, and monitoring well locations were surveyed using a handheld Global Positioning System unit. The horizontal accuracy was within 10 feet. No elevation data was collected for the soil sample or monitoring well locations.

3.0 SITE INVESTIGATION RESULTS

3.1 FIELD OBSERVATIONS

Observations made during the field sampling effort revealed that the surface soil was generally composed of a silty clay. There were very dramatic changes in topography in areas where waste was encountered throughout the Site. The most dramatic topography change was in the western section of the Site where there was an approximately 45 foot mound of waste. The waste cap over the former landfill was found to not be uniform in thickness. Metal and concrete debris were sticking up through the landfill cover soil generally in the center of the Site. There were piles of used automobile tires located throughout the Site.

Methane concentrations in ambient air were detected above background conditions in one boring. During the drilling of CB-15, methane was detected above the lower explosive limit (LEL). When this occurred the drilling operations had to be suspended until the methane concentration declined to below the LEL.

The concentrations of VOCs in ambient air were detected above background conditions in two borings. Elevated concentrations of VOCs were detected with a PID at WB-02 (14.0 parts per million [ppm]) and CB-07 (4.8 ppm).

3.2 WASTE AND CAP THICKNESS

Five of the seven borings drilled through the waste encountered buried waste. The thickness of the waste varied from approximately two to 42 feet bgs and consisted of glass, plastic, brick, wood, and rubber debris (Table 1). Where waste was encountered, the overlying soil cover (i.e. cap) ranged in thickness from approximately two to six feet bgs.

Eleven of the 19 borings drilled to determine the thickness of the cap encountered waste. The cap thickness varied from two to eight feet bgs.

During drilling of MW-07 waste was encountered to a depth of eight feet bgs. The cap was two feet thick. Waste was not encountered at any of the other monitoring wells.

Borings where no waste was encountered are considered to have no cap but consist of native soils.

It should be noted that miscellaneous debris of varying amounts was observed in the cover soil. Additionally the number of data points for cap thickness are limited and the cap thickness is variable; therefore, the data may not reflect the actual thickness and conditions away from the known data points. The approximate thickness of the waste and the thickness of the cap throughout the facility are represented in Figures 2 and 3, respectfully. The contour lines incorporate data points from existing site investigations along with the data collected during this Phase II ESA.

Two cross sections, A-A' and B-B', through the facility were reported in an existing Terracon report (Terracon, 2004) to show a three dimensional model of the condition of the municipal waste landfill (Figure 4). During the current sampling effort three data points were added to transect A-A' and two data points were added to transect B-B' to augment the three dimensional model (Figures 5 and 6, respectively).

3.3 SURFACE SOIL SAMPLES ANALYTICAL RESULTS

Previous groundwater sampling at the site (Terracon, 2004) along with groundwater sampling during this investigation has shown that groundwater is not affected above the TRRP Critical PCLs. Based on these findings, Total Soil Combined for a residential site (March, 2010) is considered the soil Critical PCL that was used to assess the data.

Detected soil concentrations are presented in Table 2. Arsenic was detected in nine of the 10 surface samples collected. Arsenic was not detected in SS-04. The concentrations of the arsenic ranged from 2.5 to 6.1 mg/kg. All of the concentrations were below the PCL of 24 mg/kg.

Barium was detected in all of the surface samples collected. The concentrations of barium in the soil samples ranged from 20 mg/kg to 270 mg/kg. All of the concentrations were below the PCL of 7,800 mg/kg.

Cadmium was detected in eight of the 10 surface samples collected. Cadmium was not detected in SS-04 and SS-06. The concentrations of cadmium in the samples ranged from 0.084 mg/kg to 0.78 mg/kg. All of the concentrations were below the PCL of 52 mg/kg.

Chromium was detected in all of the surface samples collected. The concentrations of chromium in the soil samples ranged from 8.5 mg/kg to 20 mg/kg. All of the concentrations were below the PCL of 27,000 mg/kg.

Lead was detected in all of the surface samples collected. The concentrations of lead in the soil samples ranged from 1.9 mg/kg to 93 mg/kg. All of the concentrations were below the PCL of 500 mg/kg.

Mercury was detected in seven of the ten surface soil samples collected. Mercury was not detected in SS-01, SS-04, and SS-06. The concentrations of mercury in the samples ranged from 16 mg/kg to 290 mg/kg. All of the concentrations were below the PCL of 2,100 mg/kg.

Silver and selenium were not detected in any of the surface samples collected.

3.4 GROUNDWATER SAMPLES ANALYTICAL RESULTS

Detected concentrations of chemicals identified in the groundwater samples were compared to the TRRP Tier 1 Residential Critical PCLs. The Critical PCL for each parameter is the lower of the applicable PCLs, Groundwater Ingestion ($^{GW}GW_{Ing}$) or Air Groundwater Inhalation ($^{AIR}GW_{Inh-V}$), and is shown on Table 3. For the parameters analyzed in this investigation, all of the PCLs came from the Texas TRRP Tier I Residential $^{GW}GW_{Ing}$ (March, 2010).

Detected groundwater concentrations are presented in Table 3. Twenty metals were detected in the groundwater samples collected from MW-2R. Two of the metals, total beryllium and total manganese, were detected above the Critical PCLs of four micrograms per liter (ug/L) and 1,100 ug/L, respectively.

The groundwater samples collected from MW-4R contained two VOCs (carbon disulfide and dichlorodifluoromethane). Both of the VOC concentrations were below their respective Critical PCLs. Four SVOCs were detected in the samples but none of the concentrations were above the Critical PCLs. Twenty-four metals were detected in the groundwater sample, but none of the concentrations were above the Critical PCLs.

The groundwater samples collected from MW-6 contained the VOC chloroform. The concentration of chloroform was detected below the Critical PCL. There were two SVOCs that were detected in the groundwater samples from MW-6 (di-n-octyl phthalate and caprolactum).

Both of the concentrations were detected below the critical PCLs. Twenty-five metals were detected in the groundwater sample, but none of the concentrations were above their Critical PCLs.

The groundwater samples collected from MW-7 contained the VOC chloroform. The concentration of chloroform was detected below the Critical PCL. There were seven SVOCs detected in the groundwater sample. Benzo[a]pyrene was detected at a concentration of 2.1 ug/L which is above the Critical PCL of 0.2 ug/L. Thirty-one metals were detected in the groundwater sample. The concentrations of eight of the metals detected were above their respective Critical PCLs.

3.5 DATA VALIDATION RESULTS

Data validation constitutes an independent QA review which was completed on each of the reported laboratory results. Overall, 100% of the data were considered valid as reported or with estimation. It was recommended that the reported analytical results be used only with the qualifying statements presented.

Results of the data validation are presented in Appendix E and the appropriate qualifiers have been added to the laboratory data tables. Qualified data should be considered estimated, as discussed previously in this report. Data that were not qualified should be considered quantitatively and qualitatively valid as reported based on the laboratory deliverables provided.

4.0 CONCLUSIONS AND RECOMMENDATIONS

There were very dramatic changes in topography in areas where waste was encountered throughout the Site. The most dramatic topography change was in the western section of the Site where there was approximately 45 feet of mounded waste.

Five of the seven borings targeted to drill through the waste encountered buried waste (Figure 3). The thickness of the waste varied from approximately two to 42 feet bgs and consisted of glass, plastic, brick, wood, and rubber debris. During drilling of MW-7, which is located along the northern boarder of the project Site, waste was encountered to a depth of eight feet bgs. It can be concluded that the northern extent of the waste is not known because waste was unexpectedly found at MW-7. Previous investigations have found the waste thickness to vary between 4 and 64 feet bgs (Terracon 2004 and 2005).

The overlying soil cover (i.e. cap) ranged in thickness from approximately two to eight feet bgs where waste was encountered (Figure 4). Eleven of the 19 borings drilled to determine the thickness of the cap encountered waste. Previous investigations found the cap thickness to vary between 2 and 13 feet bgs. It can be concluded that the site in its current condition does not have uniform soil cover.

It is recommended that improvements be made to the cap before redevelopment at the Bellfort Landfill can occur. These improvements should include adding to the existing soil cover to establish an acceptable minimum thickness of cap material that is free of debris.

Methane was detected during the drilling of one boring at a concentration high enough to stop drilling. It is recommended that methane should be monitored during future construction activities.

No materials that resembled incinerator ash were encountered during the field investigation activities. The description of the surface materials where soil samples were collected indicated the presence of soil. Metals were detected in all of the surface samples but none of the concentrations were above the Critical PCLs. Based on the lack of elevated metal concentrations in the soil samples it can be concluded that incinerator ash was not found during the Phase II ESA.

Groundwater samples collected from two of the four temporary monitoring wells contained concentrations of metals and one SVOC that exceeded their respective Critical PCLs. Although there are exceedances of the Critical PCLs in the groundwater, the area is served by municipal water. Groundwater will not be used to supply water for any future development of the Site. There is no direct exposure pathway for contaminants in the groundwater to potentially impact human receptors; thus there is no need for further action.

5.0 REFERENCES

United States Environmental Protection Agency (EPA). 2010. National Functional Guidelines for Inorganic Data Review.

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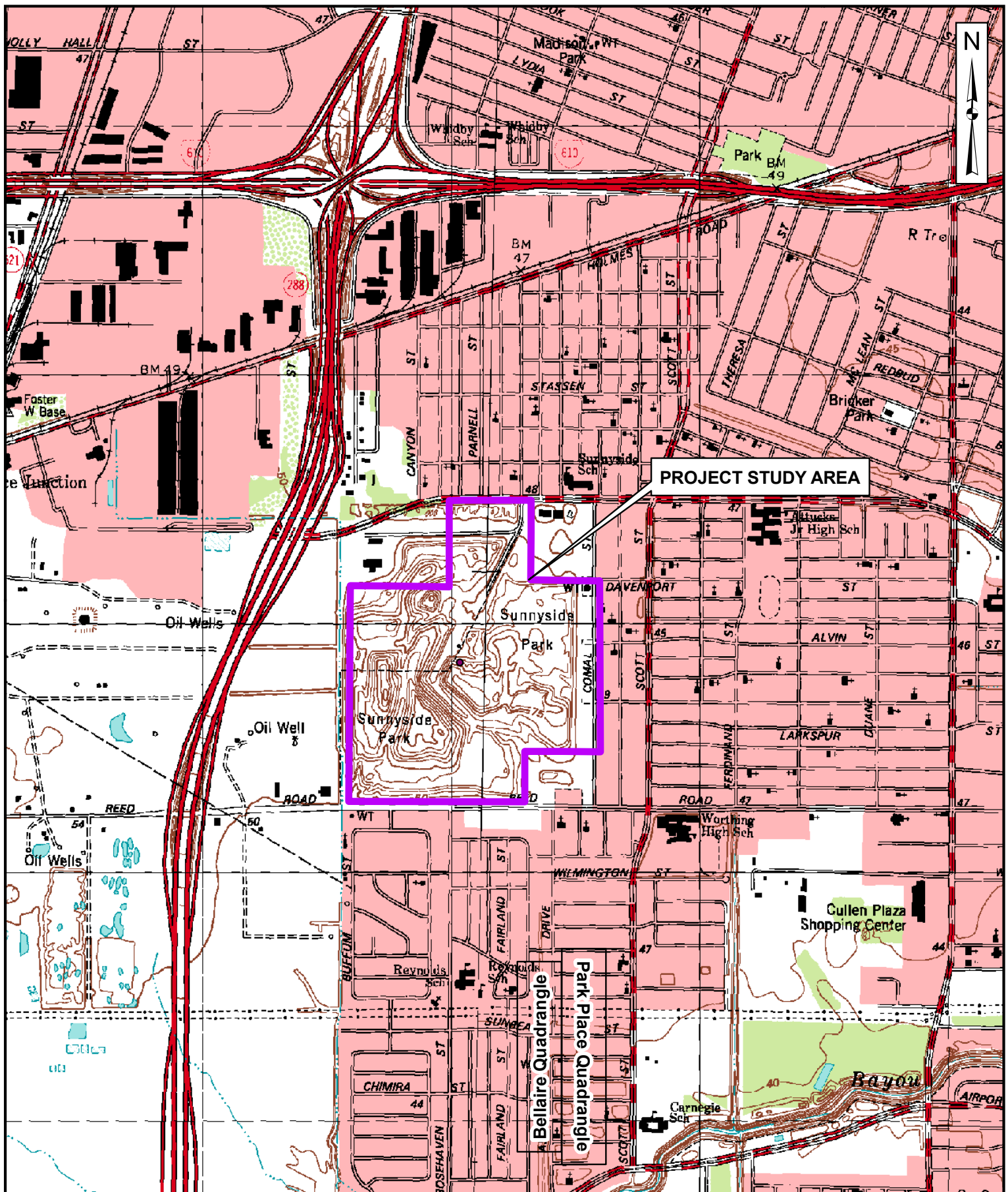
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FIGURES



Bellaire & Park Place Quadrangles

SCALE: 1:20,000

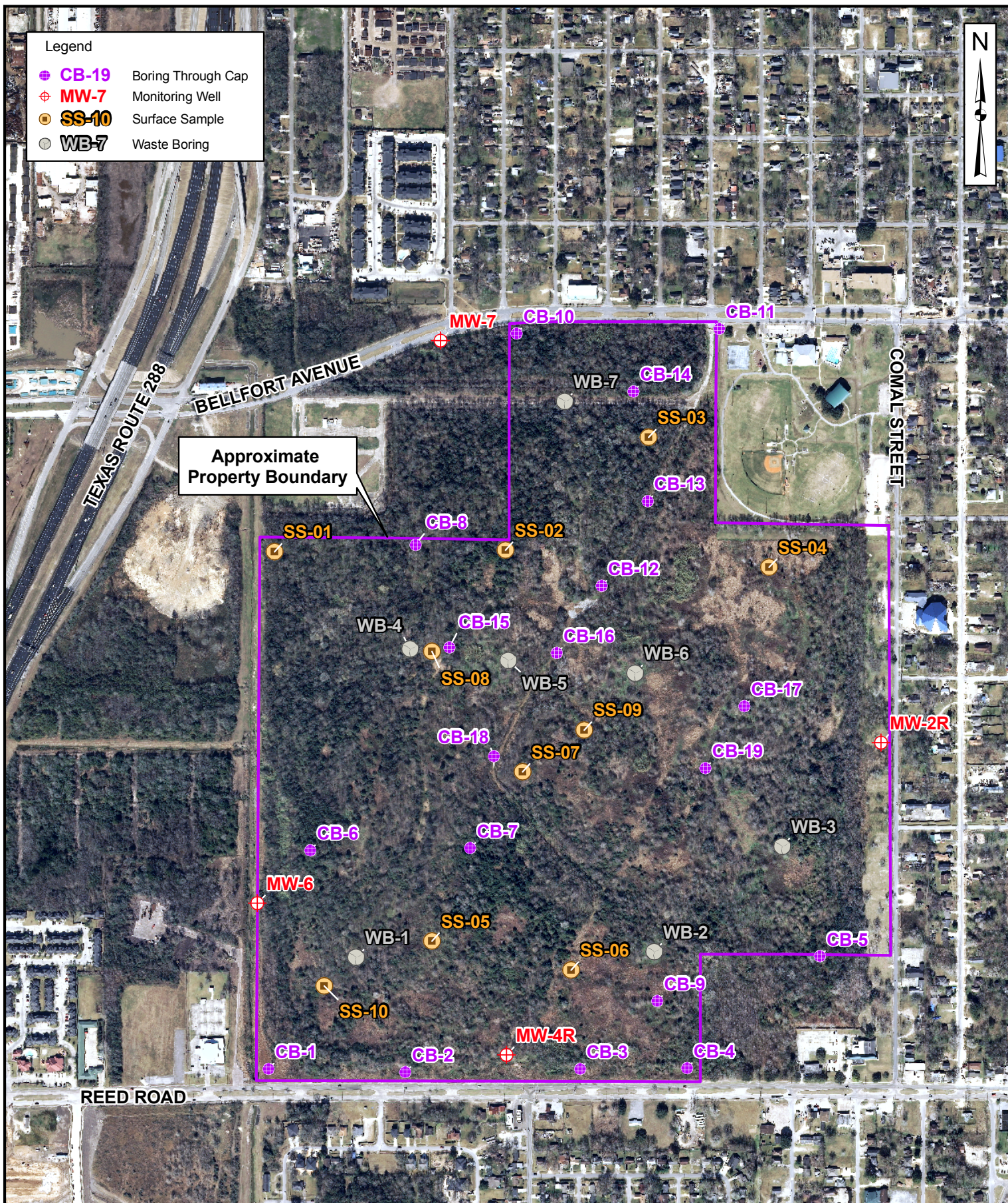
0 1,000 2,000 3,000 Feet

FIGURE 1 SITE LOCATION Phase II ESA

BELLFORT LANDFILL, HOUSTON, TEXAS

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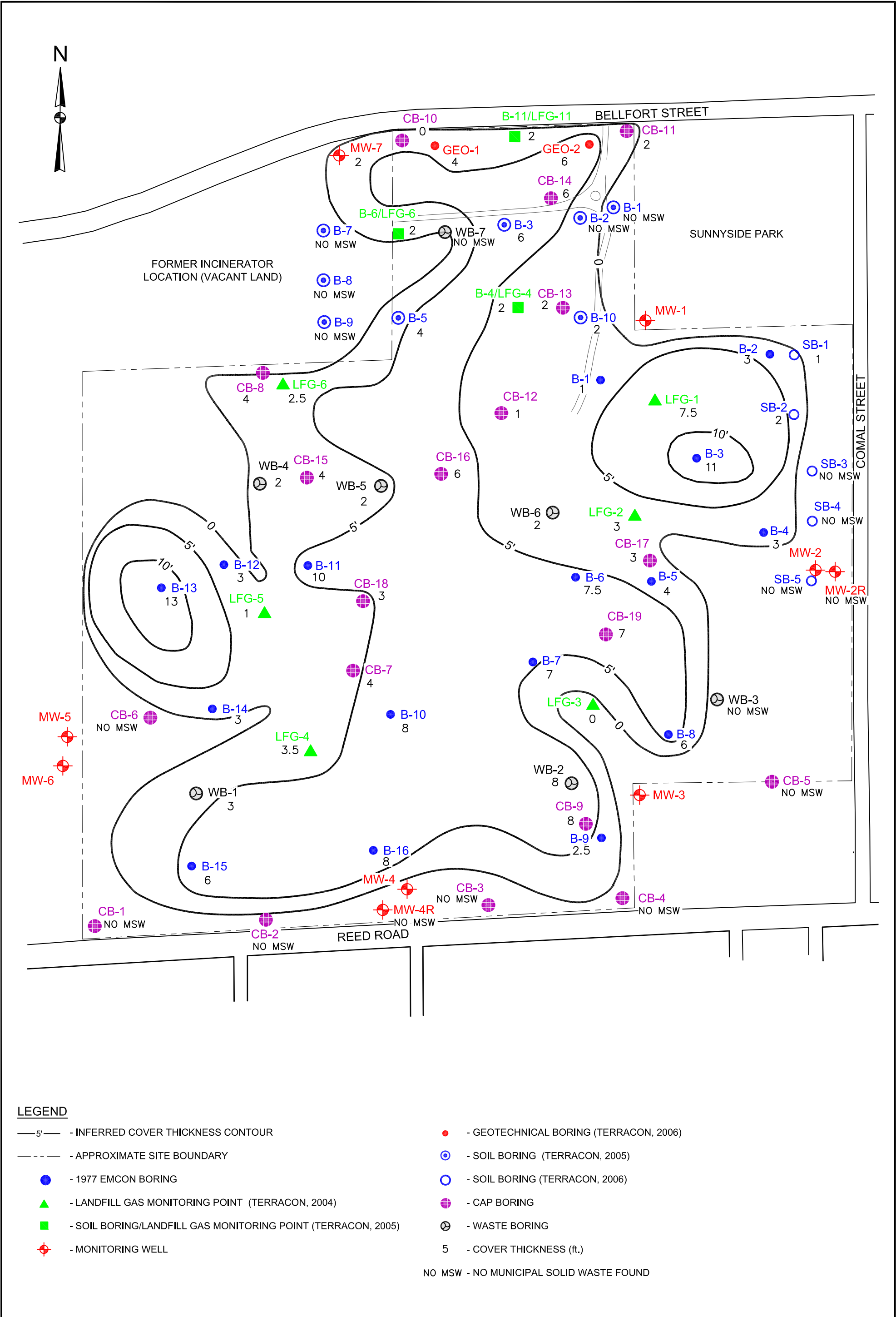
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FIGURE 2
SOIL BORING & MONITORING WELL LOCATIONS
 Phase II ESA
 BELLFORT LANDFILL, HOUSTON, TEXAS

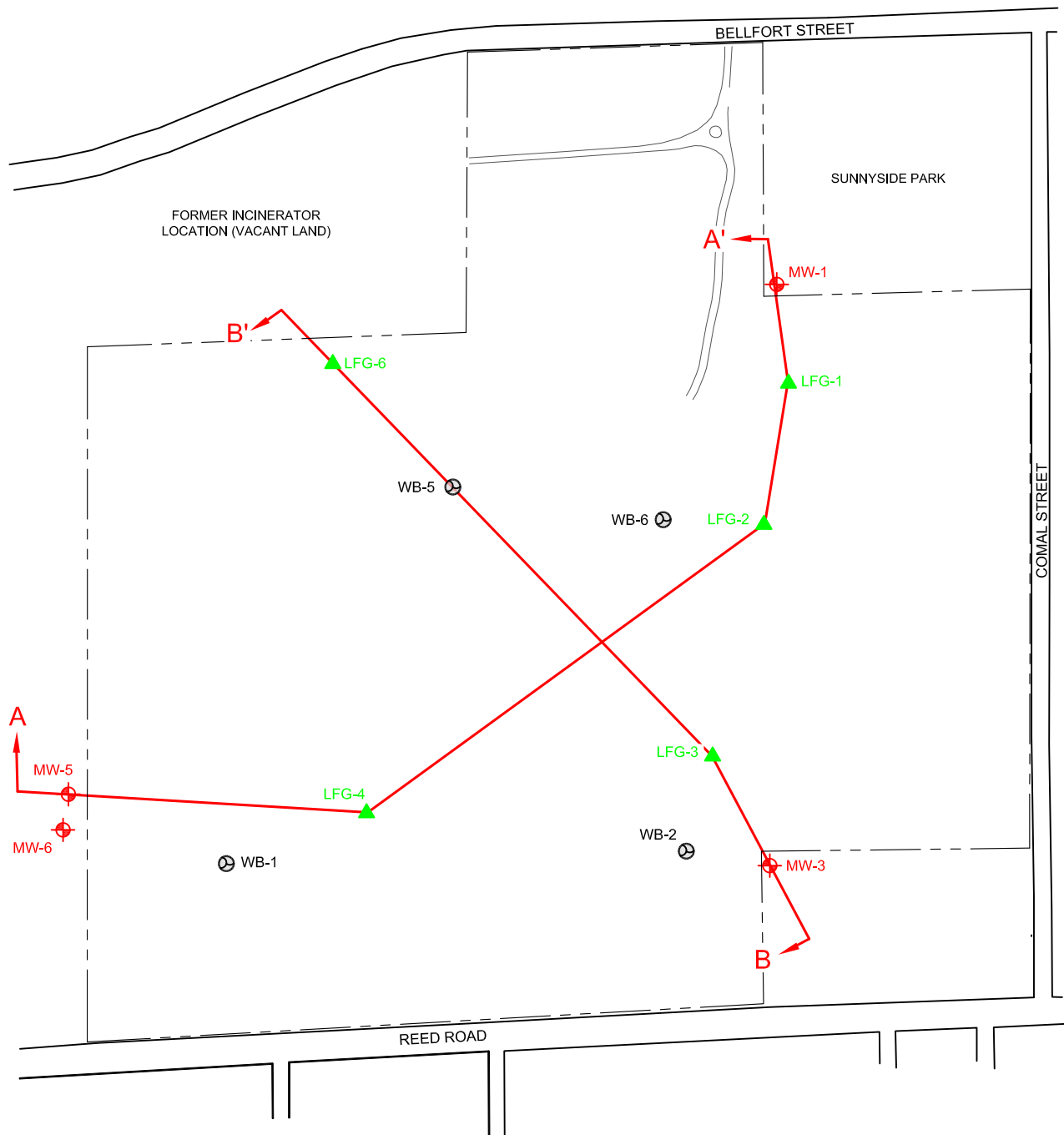
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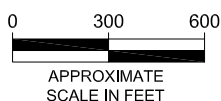


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LEGEND

- - - - - APPROXIMATE SITE BOUNDARY
- A A' - CROSS SECTION LOCATIONS
- ⊕ - MONITORING WELL
- ▲ - LANDFILL GAS MONITORING POINT (TERRACON, 2004)
- ⊗ - WASTE BORING



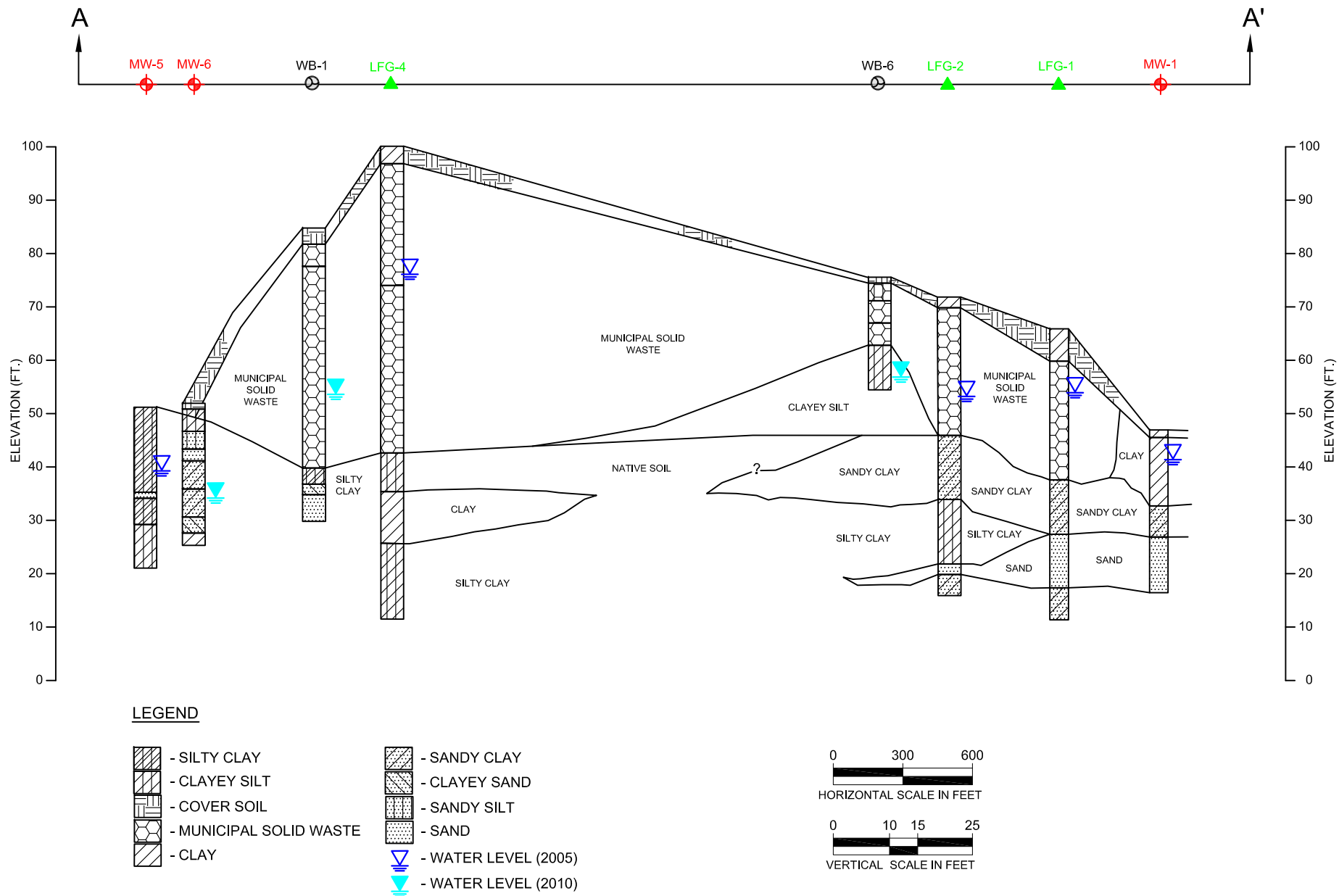
**FIGURE 5
CROSS SECTION
BORING LOCATIONS**
Phase II ESA
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SOURCE: TAKEN FROM TERRACON



NOTES:

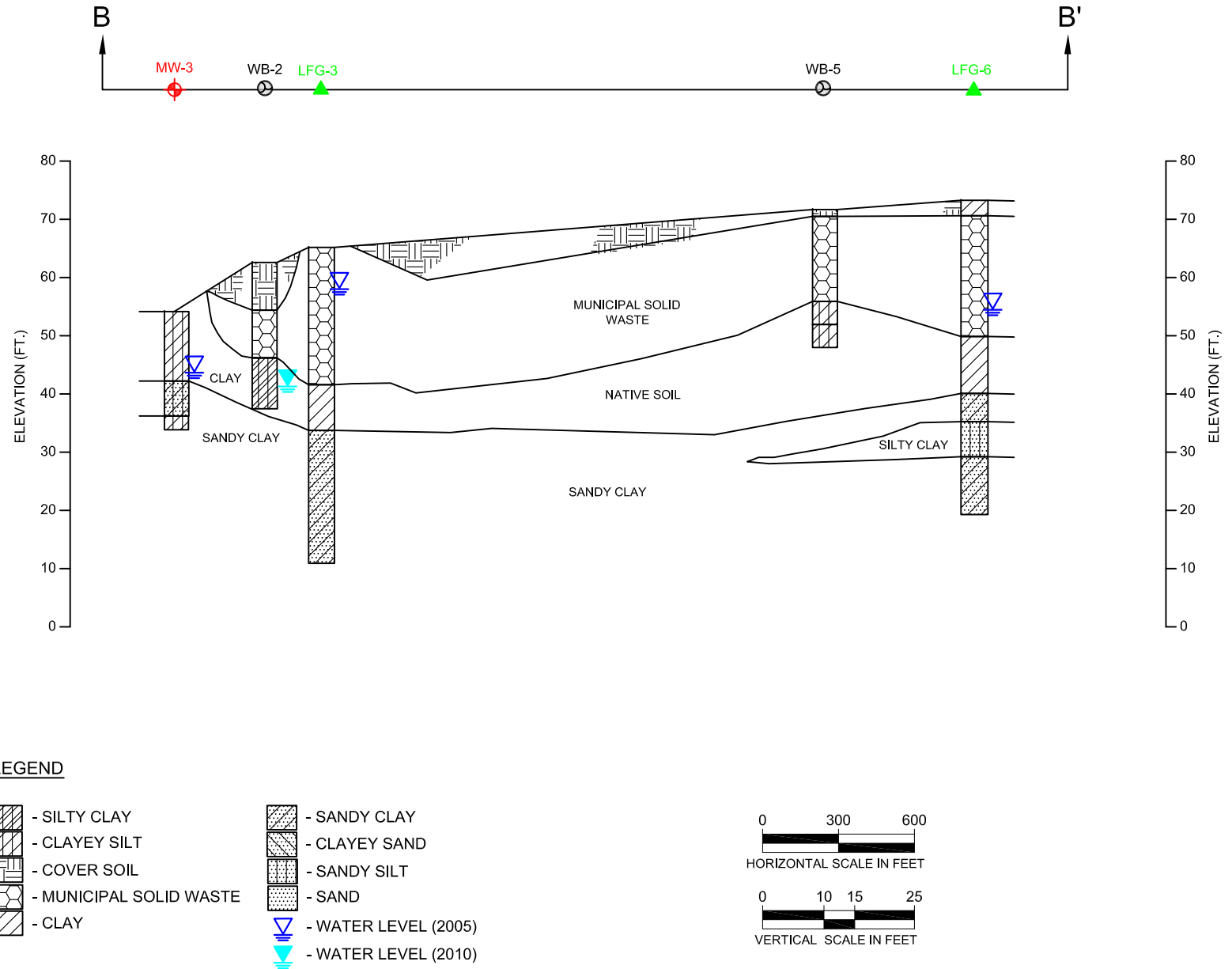
1. SEE FIGURE 2 FOR CROSS SECTION LOCATION
2. ELEVATION IN FEET - APPROXIMATED ABOVE MEAN SEA LEVEL FROM THE 1995 USGS 7.5' TOPOGRAPHIC MAP (BELLAIRE, TEXAS)

SOURCE: TAKEN FROM TERRACON

FIGURE 6
CROSS SECTION A-A
Phase II ESA
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NOTES:

1. SEE FIGURE 2 FOR CROSS SECTION LOCATION
2. ELEVATION IN FEET - APPROXIMATED ABOVE MEAN SEA LEVEL FROM THE 1995 USGS 7.5' TOPOGRAPHIC MAP (BELLAIRE, TEXAS)

SOURCE: TAKEN FROM TERRACON

FIGURE 7
CROSS SECTION B-B
Phase II ESA
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Table 1
Soil Boring Depth, Cap Thickness, and Waste Thickness Summary
Phase II ESA
Bellfort Landfill, Houston, TX

Soil Boring/Monitoring Well ID	Total Depth of Boring (Feet bgs)	Thickness of Cap (Feet)	Thickness of Waste (Feet)	Notes
CB-1	10	NO MSW	0	No waste identified. No cap identified. All native soil.
CB-2	10	NO MSW	0	No waste identified. No cap identified. All native soil.
CB-3	10	NO MSW	0	No waste identified. No cap identified. All native soil.
CB-4	10	NO MSW	0	No waste identified. No cap identified. All native soil.
CB-5	10	NO MSW	0	No waste identified. No cap identified. All native soil.
CB-6	10	NO MSW	0	Hit refusal during first two attempts at 5 feet bgs. Groundwater detected at 7 feet bgs. No waste identified. No cap identified. All native soil.
CB-7	10	4	UNK	Trash including plastic, wood, and cloth detected at 4 feet bgs. Petroleum smell to soil. PID hit of 4.8 at 7 feet bgs.
CB-8	10	4	5	Trash including glass, tar, and charcoal detected between 4 and 9 feet bgs.
CB-9	10	8	UNK	Trash including plastic, fiberglass insulation, and wood detected at 8 feet bgs.
CB-10	10	6	UNK	Groundwater detected at 6 feet bgs. Mixed plastic and glass detected throughout the boring. No cap present.
CB-11	10	2	1	Few pieces of glass and plastic encountered between 2 and 3 feet bgs. Cap thickness is 2 feet.
CB-12	10	1	4	Metal, glass, and wood fragments detected between 1 and 5 feet bgs. Groundwater detected at 6 feet bgs.
CB-13	10	2	4	Plastic trash encountered between 2 and 6 feet bgs. Groundwater detected at 9 feet bgs.
CB-14	10	6	2	Small amount of plastic detected between 6 and 8 feet bgs.
CB-15	10	4	UNK	Tar soaked cloth and wood fragments detected at 4 feet bgs. Methane concentration spike during drilling operations. Drilling operations halted to let methane disperse.

Table 1
Soil Boring Depth, Cap Thickness, and Waste Thickness Summary
Phase II ESA
Bellfort Landfill, Houston, TX

Soil Boring/Monitoring Well ID	Total Depth of Boring (Feet bgs)	Thickness of Cap (Feet)	Thickness of Waste (Feet)	Notes
CB-16	6	6	UNK	Concrete refusal at 6 feet bgs. Six other holes attempted with the same result.
CB-17	10	3	UNK	Plastic and wood detected at 3 feet bgs. Groundwater detected at 9 feet bgs.
CB-18	10	2	UNK	Glass and metal detected at 2 feet bgs. Groundwater detected at 6 feet bgs.
CB-19	10	7	UNK	Plastic detected at 7 feet bgs.
MW-2R	55	NO MSW	0	Groundwater measured at 48 feet bgs. All native soil.
MW-4R	35	NO MSW	0	Groundwater measured at 30 feet bgs. All native soil.
MW-6	25	NO MSW	0	Groundwater measured at 16 feet bgs. All native soil.
MW-7	25	2	6	Groundwater measured at 18 feet bgs. Plastic and glass detected between 2 and 8 feet bgs.
WB-1	55	3	42	Groundwater detected at 31 feet bgs. Glass, plastic, and brick detected between 3 and 45 feet bgs.
WB-2	25	8	8	Groundwater detected at 21 feet bgs. Metal, rubber, glass, and plastic detected between 8 and 16 feet bgs.
WB-3	10	NO MSW	0	No waste identified. No cap identified. All native soil.
WB-4	32	2	24	Glass and plastic detected between 2 and 26 feet bgs.
WB-5	24	2	14	Glass and plastic detected between 3 and 16 feet bgs. Three holes were attempted and hit refusal at 4 feet bgs.
WB-6	20	2	10	Groundwater detected at 17 feet bgs. Glass, plastic, wood, and rubber detected between 2 and 12 feet bgs.
WB-7	10	NO MSW	0	No waste identified. No cap identified. All native soil.

Notes:

bgs-below ground surface

NO MSW- No municipal solid waste found

UNK-unknown waste depth

TABLES

Table 2
Detected Soil Concentrations
Phase II ESA
Bellfort Landfill, Houston, TX

Sample ID	Parameter	Result	MDL	Unit	Lab Qualifier	Validation Qualifier	TRRP Residential¹ Soil PCLs
SS-01	Arsenic	3.8	0.66	mg/Kg			24
SS-01	Barium	220	0.076	mg/Kg			7,800
SS-01	Cadmium	0.11	0.041	mg/Kg	J	J	52
SS-01	Chromium	10	0.058	mg/Kg			27,000
SS-01	Lead	14	0.27	mg/Kg		J	500
SS-02	Arsenic	2.5	0.66	mg/Kg			24
SS-02	Barium	100	0.076	mg/Kg			7,800
SS-02	Cadmium	0.74	0.041	mg/Kg			52
SS-02	Chromium	10	0.058	mg/Kg	J		27,000
SS-02	Lead	60	0.27	mg/Kg	J	J	500
SS-02	Mercury	56	5.5	ug/Kg		J-	2,100
SS-03	Arsenic	3.2	0.66	mg/Kg			24
SS-03	Barium	160	0.076	mg/Kg			7,800
SS-03	Cadmium	0.66	0.041	mg/Kg			52
SS-03	Chromium	15	0.058	mg/Kg			27,000
SS-03	Lead	93	0.27	mg/Kg		J	500
SS-03	Mercury	120	5.5	ug/Kg		J-	2,100
SS-04	Barium	20	0.076	mg/Kg			7,800
SS-04	Chromium	1.6	0.058	mg/Kg	J	J	27,000
SS-04	Lead	1.9	0.27	mg/Kg		J	500
SS-05	Arsenic	4.4	0.66	mg/Kg			24
SS-05	Barium	270	0.076	mg/Kg			7,800
SS-05	Cadmium	0.17	0.041	mg/Kg	J	J	52
SS-05	Chromium	13	0.058	mg/Kg			27,000
SS-05	Lead	43	0.27	mg/Kg		J	500
SS-05	Mercury	290	5.5	ug/Kg		J-	2,100

Table 2
Detected Soil Concentrations
Phase II ESA
Bellfort Landfill, Houston, TX

Sample ID	Parameter	Result	MDL	Unit	Lab Qualifier	Validation Qualifier	TRRP Residential ¹ Soil PCLs
SS-06	Arsenic	3.7	0.66	mg/Kg			24
SS-06	Barium	140	0.076	mg/Kg			7,800
SS-06	Chromium	14	0.058	mg/Kg			27,000
SS-06	Lead	8.8	0.27	mg/Kg		J	500
SS-07	Arsenic	5.2	0.66	mg/Kg			24
SS-07	Barium	270	0.076	mg/Kg			7,800
SS-07	Cadmium	0.11	0.041	mg/Kg	J	J	52
SS-07	Chromium	8.5	0.058	mg/Kg			27,000
SS-07	Lead	62	0.27	mg/Kg		J	500
SS-07	Mercury	73	5.5	ug/Kg		J-	2,100
SS-08	Arsenic	3.1	0.66	mg/Kg			24
SS-08	Barium	67	0.076	mg/Kg			7,800
SS-08	Cadmium	0.78	0.041	mg/Kg			52
SS-08	Chromium	8.5	0.058	mg/Kg			27,000
SS-08	Lead	68	0.27	mg/Kg		J	500
SS-08	Mercury	98	5.5	ug/Kg		J-	2,100
SS-09	Arsenic	6.1	0.66	mg/Kg			24
SS-09	Barium	220	0.076	mg/Kg			7,800
SS-09	Cadmium	0.12	0.041	mg/Kg	J	J	52
SS-09	Chromium	13	0.058	mg/Kg			27,000
SS-09	Lead	33	0.27	mg/Kg		J	500
SS-09	Mercury	29	5.5	ug/Kg		J-	2,100
SS-10	Arsenic	4.3	0.66	mg/Kg			24
SS-10	Barium	180	0.076	mg/Kg			7,800
SS-10	Cadmium	0.084	0.041	mg/Kg	J	J	52
SS-10	Chromium	20	0.058	mg/Kg			27,000
SS-10	Lead	21	0.27	mg/Kg		J	500
SS-10	Mercury	16	5.5	ug/Kg		J-	2,100

Notes:

J – The reported value was quantitatively estimated because of a QC exceedance or because the concentration was below the Limit Of Quantitation.

J- – The reported value should be considered a biased low quantitative estimate.

MDL - Method Detection Limit

¹ TRRP Residential Soil PCLs - TX TRRP Table 1, Tier 1 Residential Soil PCLs for 30 Acre Source Area: Total Soil Combined; Updated 31March2010

Table 3
Detected Groundwater Concentrations and TRRP Exceedances
Phase II ESA
Bellfort Landfill, Houston, TX

Sample ID	Parameter	Fraction	Result	MDL	Unit	Lab Qualifier	Validation Qualifier	TRRP Residential ¹ Groundwater Critical PCLs
MW-2R	Total Barium	M	170	0.58	ug/L			2,000.0
MW-2R	Total Calcium	M	200,000	34	ug/L			NL
MW-2R	Total Copper	M	3.2	1.4	ug/L	J Q	J	1,300.0
MW-2R	Total Lead	M	120,000	11	ug/L			15.0
MW-2R	Total Nickel	M	4,500	240	ug/L			490.0
MW-2R	Total Thallium	M	1.9	1.1	ug/L	J	J	2.0
MW-2R	Total Beryllium	M	1,100	22	ug/L		J	4.0
MW-2R	Total Manganese	M	600	0.25	ug/L	Q		1,100.0
MW-2R	Total Sodium	M	650,000	92	ug/L	B		NL
MW-2R	Total Zinc	M	5.2	4.5	ug/L	J	J	7,300.0
MW-2R	Dissolved Barium	M	170	0.58	ug/L			2,000.0
MW-2R	Dissolved Cadmium	M	0.55	0.45	ug/L	J	J	5.0
MW-2R	Dissolved Calcium	M	210,000	34	ug/L			NL
MW-2R	Dissolved Copper	M	3.2	1.4	ug/L	J Q	J	1,300.0
MW-2R	Dissolved Magnesium	M	130,000	11	ug/L			NL
MW-2R	Dissolved Manganese	M	580	0.25	ug/L	Q		1,100.0
MW-2R	Dissolved Potassium	M	4,500	240	ug/L			NL
MW-2R	Dissolved Sodium	M	660,000	92	ug/L			NL
MW-2R	Dissolved Zinc	M	5.4	4.5	ug/L	J	J	7,300.0
MW-2R	Total Mercury	M	0.033	0.027	ug/L	J	J	2.0
MW-4R	Di-n-butyl phthalate	OS	12	1.2	ug/L	J	J	2,400.0
MW-4R	Diethyl phthalate	OS	0.97	0.38	ug/L	J	J	20,000.0
MW-4R	Acetophenone	OS	0.69	0.24	ug/L	J	J	1,500.0
MW-4R	Caprolactam	OS	140	5.0	ug/L		J	12,000.0
MW-4R	Carbon disulfide	OV	0.83	0.45	ug/L	J	J	2,400.0
MW-4R	Dichlorodifluoromethane	OV	1.0	0.31	ug/L	J	J	4,900.0
MW-4R	Total Aluminum	M	5,200	18	ug/L		J	24,000.0
MW-4R	Total Arsenic	M	6.1	4.4	ug/L	J	J	10.0
MW-4R	Total Barium	M	340	0.58	ug/L			2,000.0
MW-4R	Total Calcium	M	170,000	34	ug/L			NL
MW-4R	Total Copper	M	10	1.4	ug/L	J Q	J	1,300.0
MW-4R	Total Cobalt	M	2.4	1.2	ug/L	J	J	7.3
MW-4R	Total Iron	M	3.6	2.6	ug/L	J	J	NL
MW-4R	Total Lead	M	120,000	11	ug/L			15.0
MW-4R	Total Magnesium	M	6.1	1.3	ug/L	J Q	J	NL
MW-4R	Total Nickel	M	3,900	240	ug/L			490.0

Table 3
Detected Groundwater Concentrations and TRRP Exceedances
Phase II ESA
Bellfort Landfill, Houston, TX

Sample ID	Parameter	Fraction	Result	MDL	Unit	Lab Qualifier	Validation Qualifier	TRRP Residential ¹ Groundwater Critical PCLs
MW-4R	Total Thallium	M	13	1.1	ug/L	J	J	2.0
MW-4R	Total Beryllium	M	5,000	22	ug/L		J	4.0
MW-4R	Total Manganese	M	880	0.25	ug/L	Q		1,100.0
MW-4R	Total Sodium	M	390,000	92	ug/L	B		NL
MW-4R	Total Zinc	M	27	4.5	ug/L	J	J	7,300.0
MW-4R	Dissolved Barium	M	310	0.58	ug/L			2,000.0
MW-4R	Dissolved Calcium	M	160,000	34	ug/L			NL
MW-4R	Dissolved Copper	M	2.3	1.4	ug/L	J Q	J	1,300.0
MW-4R	Dissolved Iron	M	410	22	ug/L			NL
MW-4R	Dissolved Magnesium	M	110,000	11	ug/L			NL
MW-4R	Dissolved Manganese	M	800	0.25	ug/L	Q		1,100.0
MW-4R	Dissolved Potassium	M	2,100	240	ug/L	J	J	NL
MW-4R	Dissolved Sodium	M	370,000	92	ug/L			NL
MW-4R	Dissolved Vanadium	M	1.2	1.1	ug/L	J Q	J	1.7
MW-6	Di-n-octyl phthalate	OS	3.8	0.35	ug/L	J	J	490.0
MW-6	Caprolactam	OS	490	5.0	ug/L		J	12,000.0
MW-6	Chloroform	OV	0.24	0.16	ug/L	J	J	240.0
MW-6	Total Aluminum	M	2,700	18	ug/L		J	24,000.0
MW-6	Total Arsenic	M	5.0	4.4	ug/L	J	J	10.0
MW-6	Total Barium	M	590	0.58	ug/L			2,000.0
MW-6	Total Calcium	M	200,000	34	ug/L			NL
MW-6	Total Copper	M	12	1.4	ug/L	J Q	J	1,300.0
MW-6	Total Cobalt	M	1.3	1.2	ug/L	J	J	7.3
MW-6	Total Iron	M	3.8	2.6	ug/L	J	J	NL
MW-6	Total Lead	M	42,000	11	ug/L			15.0
MW-6	Total Magnesium	M	5.2	1.3	ug/L	J Q	J	NL
MW-6	Total Nickel	M	5,500	240	ug/L			490.0
MW-6	Total Thallium	M	6.0	1.1	ug/L	J	J	2.0
MW-6	Total Beryllium	M	4,500	22	ug/L		J	4.0
MW-6	Total Manganese	M	360	0.25	ug/L	Q		1,100.0
MW-6	Total Sodium	M	190,000	92	ug/L	B		NL
MW-6	Total Zinc	M	19	4.5	ug/L	J	J	7,300.0
MW-6	Dissolved Barium	M	380	0.58	ug/L			2,000.0
MW-6	Dissolved Calcium	M	180,000	34	ug/L			NL
MW-6	Dissolved Copper	M	2.3	1.4	ug/L	J Q	J	1,300.0
MW-6	Dissolved Iron	M	1,100	22	ug/L			NL

Table 3
Detected Groundwater Concentrations and TRRP Exceedances
Phase II ESA
Bellfort Landfill, Houston, TX

Sample ID	Parameter	Fraction	Result	MDL	Unit	Lab Qualifier	Validation Qualifier	TRRP Residential ¹ Groundwater Critical PCLs
MW-6	Dissolved Magnesium	M	38,000	11	ug/L			NL
MW-6	Dissolved Manganese	M	240	0.25	ug/L	Q		1,100.0
MW-6	Dissolved Potassium	M	5,400	240	ug/L			NL
MW-6	Dissolved Sodium	M	210,000	92	ug/L			NL
MW-6	Dissolved Vanadium	M	3.4	1.1	ug/L	J Q	J	1.7
MW-6	Dissolved Zinc	M	5.4	4.5	ug/L	J	J	7,300.0
MW-7	N-Nitrosodiphenylamine	OS	0.97	0.44	ug/L	J	J	190.0
MW-7	Benzo[a]pyrene	OS	2.1	0.31	ug/L	J Q	J	0.2
MW-7	Di-n-butyl phthalate	OS	69	1.2	ug/L		J	2,400.0
MW-7	3,3'-Dichlorobenzidine	OS	R	2.0	ug/L	U J		2.0
MW-7	Diethyl phthalate	OS	5.1	0.38	ug/L	J	J	20,000.0
MW-7	Acetophenone	OS	0.29	0.24	ug/L	J	J	1,500.0
MW-7	Caprolactam	OS	210	5.0	ug/L		J	12,000.0
MW-7	Chloroform	OV	0.26	0.16	ug/L	J	J	240.0
MW-7	Total Aluminum	M	38,000	18	ug/L	J	J	24,000.0
MW-7	Total Arsenic	M	32	4.4	ug/L			10.0
MW-7	Total Barium	M	650	0.58	ug/L			2,000.0
MW-7	Total Calcium	M	140,000	34	ug/L			NL
MW-7	Total Chromium	M	35	0.66	ug/L	Q		100.0
MW-7	Total Copper	M	34	1.4	ug/L	Q		1,300.0
MW-7	Total Cobalt	M	28	1.2	ug/L			7.3
MW-7	Total Iron	M	35,000	22	ug/L	J	J	NL
MW-7	Total Lead	M	27	2.6	ug/L			15.0
MW-7	Total Magnesium	M	38,000	11	ug/L			NL
MW-7	Total Nickel	M	84	1.3	ug/L	Q		490.0
MW-7	Total Potassium	M	6,000	240	ug/L			NL
MW-7	Total Vanadium	M	56	1.1	ug/L			1.7
MW-7	Total Beryllium	M	2.1	0.47	ug/L			4.0
MW-7	Total Manganese	M	1,500	0.25	ug/L	Q		1,100.0
MW-7	Total Sodium	M	420,000	92	ug/L	B		NL
MW-7	Total Zinc	M	80	4.5	ug/L	J	J	7,300.0
MW-7	Dissolved Arsenic	M	23	4.4	ug/L	J	J	10.0
MW-7	Dissolved Barium	M	440	0.58	ug/L			2,000.0
MW-7	Dissolved Calcium	M	130,000	34	ug/L			NL
MW-7	Dissolved Chromium	M	1.0	0.66	ug/L	J Q	J	100.0
MW-7	Dissolved Cobalt	M	17	1.2	ug/L			7.3

Table 3
Detected Groundwater Concentrations and TRRP Exceedances
Phase II ESA
Bellfort Landfill, Houston, TX

Sample ID	Parameter	Fraction	Result	MDL	Unit	Lab Qualifier	Validation Qualifier	TRRP Residential ¹ Groundwater Critical PCLs
MW-7	Dissolved Copper	M	2.6	1.4	ug/L	J Q	J	1,300.0
MW-7	Dissolved Iron	M	1,700	22	ug/L			NL
MW-7	Dissolved Magnesium	M	33,000	11	ug/L			NL
MW-7	Dissolved Manganese	M	1,200	0.25	ug/L	Q		1,100.0
MW-7	Dissolved Nickel	M	57	1.3	ug/L			490.0
MW-7	Dissolved Potassium	M	960	240	ug/L	J	J	NL
MW-7	Dissolved Sodium	M	460,000	92	ug/L			NL
MW-7	Dissolved Vanadium	M	1.4	1.1	ug/L	J Q	J	1.7
MW-7	Dissolved Zinc	M	6.0	4.5	ug/L	J	J	7,300.0

Notes:

J – The reported value was quantitatively estimated because of a QC exceedance or because the concentration was below the Limit Of Quantitation.

R – The “non-detect” result for this compound was rejected.

B - Blank contamination: The analyte was detected above one-half the reporting limit in an associated blank.

Q - One or more quality control criteria failed.

MDL - Method Detection Limit

¹ TRRP Residential Groundwater PCLs - TX TRRP Table 3, Tier 1 Residential Groundwater PCLs: GWGWIng; Updated 31March2010

Highlighted - concentration exceeds TX TRRP Table 3, Tier 1 Residential Groundwater PCLs: GWGWIng; Updated 31March2010

M-metals

OV - Volatile Organic Compounds

OS - Semivolatile Organic Compounds

NL - No limit

APPENDIX A
SITE PHOTOLOG


Client Name: US Army Corps of Engineers, Fort Worth		Site Location: Bellfort Landfill, Houston, Texas	SEE Project No. 03226
Photo No. 1	Date: 6/21/10		
Direction Photo Taken: West			
Description: Drilling of MW-2R			

Photo No. 2	Date: 6/21/10	
Direction Photo Taken: East		
Description: Drilling of MW-2R		


Client Name: US Army Corps of Engineers, Fort Worth		Site Location: Bellfort Landfill, Houston, Texas	SEE Project No. 03226
Photo No. 3	Date: 6/21/10		
Direction Photo Taken: North			
Description: Sample from MW-2R from a depth of 10 to 15 feet bgs.			

Photo No. 4	Date: 6/22/10	
Direction Photo Taken: South		
Description: Drilling of CB-11		



Client Name: US Army Corps of Engineers, Fort Worth		Site Location: Bellfort Landfill, Houston, Texas	SEE Project No. 03226
Photo No. 5	Date: 6/22/10		
Direction Photo Taken: North			
Description: Drilling of CB-11 adjacent to Bellfort Street.			

Photo No. 6	Date: 6/22/10
Direction Photo Taken: North	
Description: Drill rig and support truck during the drilling of CB-11.	

A photograph showing a white International drill rig truck with a blue crane arm parked on the left side of a gravel road. A white Ram pickup truck is parked on the right side of the road. In the background, there are trees, a stop sign, and a yellow construction barrier.

PHOTOGRAPHIC LOG


Client Name: US Army Corps of Engineers, Fort Worth		Site Location: Bellfort Landfill, Houston, Texas	SEE Project No. 03226
Photo No. 7	Date: 6/23/10		
Direction Photo Taken: West			
Description: Geoprobe used for WB-6.			

Photo No. 8	Date: 6/23/10	
Direction Photo Taken: North		
Description: Sample from WB-6 with municipal solid waste in sample.		

PHOTOGRAPHIC LOG


Client Name:		Site Location:	SEE Project No.
Photo No. 9	Date: 6/24/10		
Direction Photo Taken: North			
Description: Buggy drill rig to drill WB-1.			

Photo No. 10	Date: 6/24/10	
Direction Photo Taken: South		
Description: Sample collected from WB-1 from a depth of 10 to 15 feet bgs.		

APPENDIX B
SOIL BORING LOGS

DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 2
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 8 1/4" OD HSA		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Drill Rig		
HOLE NUMBER: MW-2R			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: 0 DISTURBED: 0 UNDISTURBED: 0		
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Verticle			ELEVATION GROUND WATER: 48 feet bgs		
THICKNESS OF OVERBURDEN: 55 feet bgs			DATE HOLE: STARTED: 6/21/10 0945 FINISHED: 6/21/10 1230		
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 55 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS	Well: MW-2R Elev.:
0			CLAYEY SILT, plastic, soft, dry, very dark grayish brown, 10YR 3/2	48/60		0		Area was recently seeded and freshly mowed. No waste was encountered during boring.	
5	ML					0			
10			SILTY CLAY, plastic, medium stiff, dry, yellowish red, 5YR 4/6	60/60		0			
15	CL			60/60		0			
20			SILTY CLAY, plastic, medium stiff, dry, light brownish gray 2.5Y 6/2, with orange/brown mottles	60/60		0			
25	CL			60/60		0			
30			SILTY CLAY, plastic, stiff, dry, yellowish red, 5YR 4/6	60/60		0			

Grout

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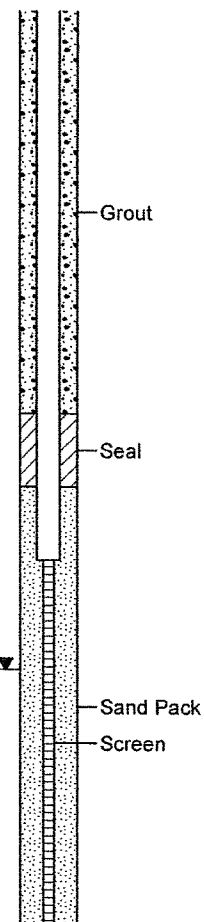
Stell Environmental Enterprises, Inc
25 East Main Street
Elverson, PA
Project # 03225

HOLE NUMBER: MW-2R
(SHEET 1 OF 2)

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DRILLING LOG			DIVISION	INSTALLATION				SHEET 2 OF 2	
Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS	
30				60/60		0			
						0			
35				60/60		0			
						0			
40	CL			60/60		0			
						0			
45				60/60		0			
						0			
	SM		SILTY SAND, well sorted, fine grained, soft, wet, gray, 2.5Y 6/1			0		Groundwater at 48 feet bgs. 24 hour water level = 10.82 feet bgs.	
50						0			
	CL		SILTY CLAY, plastic, stiff, wet, gray, 2.5Y 5/1	60/60		0			
						0			
55						0		Bottom of hole at 55 feet bgs.	
						0			
60									
65									

Well: MW-2R
Elev.:



Stell Environmental Enterprises, Inc.
...The Difference!

Stell Environmental Enterprises, Inc
25 East Main Street
Elverson, PA
Project # 03225

HOLE NUMBER: MW-2R

(SHEET 2 OF 2)

DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 2
PROJECT: Belfort Landfill			SIZE AND TYPE OF BIT: 8 1/4" OD HSA		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Drill Rig		
HOLE NUMBER: MW-4R			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0 UNDISTURBED: 0
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Verticle			ELEVATION GROUND WATER: 30 feet bgs		
THICKNESS OF OVERBURDEN: 35 feet bgs			DATE HOLE: 6/21/10 1400		FINISHED: 6/21/10 1550
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 35 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS	Well: MW-4R Elev.:
0			CLAYEY SILT, plastic, soft, dry, very dark brown, 7.5YR 3/2			0		No waste encountered in boring.	
5	ML			48/60		0			
10			Gravel layer, 1/2 to 1 inch in size.	36/60		0			
15	CL		SILTY CLAY, plastic, soft, dry, reddish brown, 2.5YR 4/4	60/60		0			
20	CL		Wet layer of gray CLAY, 2.5YR 5/1	48/60		0			
25	CL		SILTY CLAY, semiplastic, stiff, dry, dark reddish brown, 2.5YR 3/4	60/60		0			
30				48/60		0			

Grout

Casing

Seal

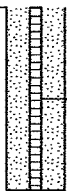
Sand Pack


Screen

Groundwater at 30 feet bgs.

	Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: MW-4R (SHEET 1 OF 2)

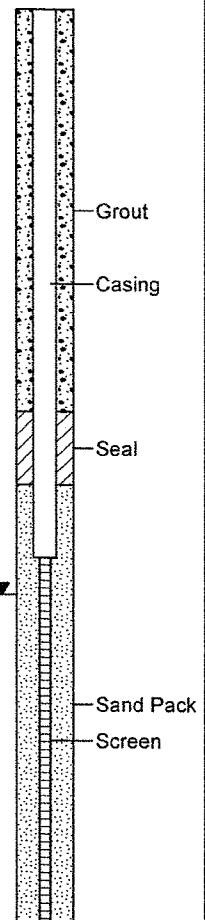
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DRILLING LOG			DIVISION	INSTALLATION					SHEET 2 OF 2	
Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS		
30	ML		CLAYEY SILT, semiplastic, medium stiff, wet, reddish brown, 2.5YR 3/4	60/60		0	▼	Groundwater at 30 feet bgs.		Well: MW-4R Elev.:
0						24 hour water level = 8.76 feet bgs.				
0						Bottom of hole at 35 feet bgs.				
35										
40										
45										
50										
55										
60										
65										

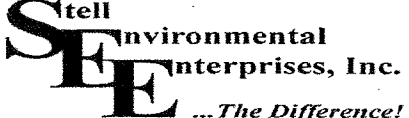
	Stell Environmental Enterprises, Inc 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: MW-4R (SHEET 2 OF 2)
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DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 8 1/4" OD HSA		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Drill Rig		
HOLE NUMBER: MW-6			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: 0 DISTURBED: 0 UNDISTURBED: 0		
NAME OF DRILLER: Sonny Tabolita			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Verticle			ELEVATION GROUND WATER: 16 feet bgs		
THICKNESS OF OVERBURDEN: 25 feet bgs			DATE HOLE: STARTED: 6/23/10 1015 FINISHED: 6/23/10 1130		
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 25 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		





Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS	Well: MW-6 Elev.:
0	ML		CLAYEY SILT, plastic, stiff, dry, very dark brown, 10YR 3/2	48/60		0		No waste encountered in boring.	
5	SM		SILTY SAND, nonplastic, fine grained, well sorted, soft, dry, brown 10YR 4/3			0			
10	SW		SAND, Well Graded, fine grained, soft, dry, yellowish brown, 10YR 5/4	60/60		0			
10	SC		SANDY CLAY, fine grained, soft, plastic, dry, gray, 10YR 5/1	60/60		0			
15			SILTY CLAY, plastic, medium stiff, moist, reddish brown 5YR 4/3	60/60		0			
20	CL			60/60		0		Groundwater at 16 feet bgs. 24 hour water lever = 21.45 feet bgs.	
25				60/60		0		Bottom of hole at 25 feet bgs.	
30						0			

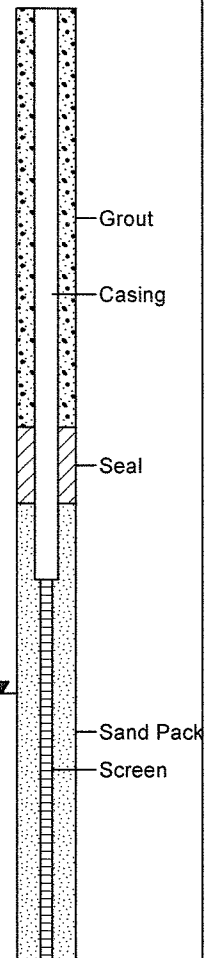


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	Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: MW-6 (SHEET 1 OF 1)
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DRILLING LOG		DIVISION		INSTALLATION		SHEET 1 of 1	
PROJECT: Bellfort Landfill				SIZE AND TYPE OF BIT: 8 1/4" OD HSA			
LOCATION: Houston, TX				DATUM FOR ELEVATION SHOWN:			
DRILLING AGENCY: Best Drilling Services				MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Drill Rig			
HOLE NUMBER: MW-7				TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0 UNDISTURBED: 0	
NAME OF DRILLER: Sonny Tabolta				TOTAL NUMBER OF CORE BOXES: 0			
DIRECTION OF HOLE: Verticle				ELEVATION GROUND WATER: 18 feet bgs			
THICKNESS OF OVERBURDEN: 25 feet bgs				DATE HOLE:		STARTED: 6/22/10 0830 FINISHED: 6/22/10 1000	
DEPTH DRILED INTO ROCK: n/a				ELEVATION TOP OF HOLE:			
TOTAL DEPTH OF HOLE: 25 feet bgs				TOTAL CORE RECOVERY: 0			
				SIGNATURE OF INSPECTOR:			

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS	Well: MW-7 Elev.:
0	CL		SILTY CLAY, medium stiff, semiplastic dry, brown, 7.5YR 4/1			0			
5	MSW		CLAYEY SILT, soft, dry, plastic, brown, 7.5 YR 4/1	24/60		0		Mixed trash, plastic, and glass. Cap thickness is 2 feet bgs.	
10				12/60		0		Bottom of waste at 8 feet bgs. Waste thickness is 6 feet.	
15				24/60		0			
20	SM		SILTY SAND, fine grained, soft, wet, nonplastic, light brownish gray, 10YR 6/2	60/60		0		24 hour water level = 6.51 feet bgs.	
25	SC		CLAYEY SAND, medium stiff, semiplastic, wet, dark grayish brown, 10YR 4/2			0			
30									




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DRILLING LOG		DIVISION		INSTALLATION		SHEET 1 OF 2	
PROJECT: Bellfort Landfill				SIZE AND TYPE OF BIT: 8 1/4" OD HSA			
LOCATION: Houston, TX				DATUM FOR ELEVATION SHOWN:			
DRILLING AGENCY: Best Drilling Services				MANUFACTURERS DESIGNATION OR DRILL: CME Model 75 Truck Mounted Rotary Rig			
HOLE NUMBER: WB-1				TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0 UNDISTURBED: 0	
NAME OF DRILLER: Sonny Tabolta				TOTAL NUMBER OF CORE BOXES: 0			
DIRECTION OF HOLE: Vertical				ELEVATION GROUND WATER: 31 feet bgs			
THICKNESS OF OVERBURDEN: 55 feet bgs				DATE HOLE:		STARTED: 6/25/10 1240 FINISHED: 6/25/10 1540	
DEPTH DRILED INTO ROCK: n/a				ELEVATION TOP OF HOLE:			
TOTAL DEPTH OF HOLE: 55 feet bgs				TOTAL CORE RECOVERY: 0			
				SIGNATURE OF INSPECTOR:			

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	SP		SANDY GRAVEL FILL, Poorly Graded, dry, nonplastic, dense, brown, 7.5YR 4/3			0		
				48/60		0		Waste encountered at 3 feet bgs. Cap thickness is 3 feet.
5	MSW		SANDY CLAY, medium stiff, dry, nonplastic, dense, brown, 7.5 YR 4/1			0		Trash, glass, plastic, brick, wood and insulation in samples to 45 feet bgs.
				26/60		0		
			ORGANIC SILTY SAND, medium dense, moist, nonplastic, black, 10 YR 2/1			0		
10				30/60		0		
						0		
15				24/60		0		
	MSW					0		
20				30/60		0		
						0		
25				45/60		0		
						0		
30						0		

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DRILLING LOG			DIVISION	INSTALLATION				SHEET 2 OF 2	
Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS	
30				50/60		0	▼	Groundwater at 31 feet bgs.	
							0		
							0		
35					24/60		0		
							0		
						0			
40				40/60		0			
						0			
						0			
45						0		Bottom of waste encountered at 45 feet bgs. Waste thickness is 42 feet.	
	CL		SILTY CLAY, medium stiff, plastic, wet, light gray with orange brown mottles, 5Y 7/1	25/60		0			
	SC		CLAYEY SAND, soft, nonplastic, wet, semiplastic, grey, 5 Y 7/1			0			
50				60/60		0			
	SW		SAND, Well Graded, fine grained, soft, wet, grey, 5Y 7/1			0			
						0			
						0		Bottom of hole at 55 feet bgs.	
55									
60									
65									



Stell Environmental Enterprises, Inc

25 East Main Street

Elverson, PA

Project # 03225

HOLE NUMBER: WB-1


(SHEET 2 OF 2)

DRILLING LOG		DIVISION		INSTALLATION		SHEET 1 OF 1	
PROJECT: Bellfort Landfill				SIZE AND TYPE OF BIT: 8 1/4" OD HSA			
LOCATION: Houston, TX				DATUM FOR ELEVATION SHOWN:			
DRILLING AGENCY: Best Drilling Services				MANUFACTURERS DESIGNATION OR DRILL: CME Tractor Mounted Rotary Drill Rig			
HOLE NUMBER: WB-2				TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0 UNDISTURBED: 0	
NAME OF DRILLER: Sonny Tabolta				TOTAL NUMBER OF CORE BOXES: 0			
DIRECTION OF HOLE: Vertical				ELEVATION GROUND WATER: 21 feet bgs			
THICKNESS OF OVERBURDEN: 25 feet bgs				DATE HOLE:		STARTED: 6/24/10 1630 FINISHED: 6/25/10 0950	
DEPTH DRILED INTO ROCK: n/a				ELEVATION TOP OF HOLE:			
TOTAL DEPTH OF HOLE: 25 feet bgs				TOTAL CORE RECOVERY: 0			
				SIGNATURE OF INSPECTOR:			

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0			CLAYEY SILT FILL, semiplastic, medium stiff, dry, brown 10YR 4/3			0		
	ML			45/60		0		
5			CLAYEY SILT, plastic, soft, dry, dark gray, 10YR 4/1			0		
	ML			50/60		0		
10			ORGANIC SILTY SAND, medium dense, nonplastic, moist, black, 10YR 2/1			0		Waste encountered at 8 feet bgs. Cap thickness is 8 feet.
	MSW			48/60		14.0		Plastic and glass in samples to 16 feet bgs.
15						4.6		
						2.5		
20			SILTY CLAY, stiff, moist, plastic, light gray, 5Y 7/1			0		Bottom of waste encountered at 16 feet bgs. Thickness of waste is 8 feet.
	CL			60/60		0		
25			SILTY CLAY, stiff, plastic, wet, light brown 7.5YR 4/6			0		
	CL			36/60		0		Groundwater at 21 feet bgs.
						0		Bottom of hole at 25 feet bgs.
30						0		

DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 2 1/4" OD Geoprobe		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: Tractor Mounted Geoprobe		
HOLE NUMBER: WB-3			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED: 0 UNDISTURBED: 0		
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Vertical			ELEVATION GROUND WATER: n/a		
THICKNESS OF OVERBURDEN: 10 feet bgs			DATE HOLE: STARTED: 6/25/10 1055 FINISHED: 6/25/10 1120		
DEPTH DRILLED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 10 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		


Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	SM		SILTY SANDY FILL, loose, dry, nonplastic, yellowish brown, 10YR 6/6			0		
	ML		CLAYEY SILT, stiff, nonplastic, dry, gray, 10YR 6/1	48/48		0		No trash encountered. No cap or waste thickness.
5	CL		SILTY CLAY, semiplastic, soft, dry, lots of organic material, very dark brown, 10YR 2/2	36/48		0		
10				12/24		0		Bottom of hole at 10 feet bgs.
15								
20								
25								
30								

	Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: WB-3 (SHEET 1 OF 1)

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DRILLING LOG		DIVISION		INSTALLATION		SHEET 1 OF 2	
PROJECT: Belfort Landfill				SIZE AND TYPE OF BIT: 2 1/4" OD Geoprobe			
LOCATION: Houston, TX				DATUM FOR ELEVATION SHOWN:			
DRILLING AGENCY: Best Drilling Services				MANUFACTURERS DESIGNATION OR DRILL: Tractor Mounted Geoprobe			
HOLE NUMBER: WB-4				TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: 0		DISTURBED: 0 UNDISTURBED: 0	
NAME OF DRILLER: Sonny Tabolta				TOTAL NUMBER OF CORE BOXES: 0			
DIRECTION OF HOLE: Vertical				ELEVATION GROUND WATER: n/a			
THICKNESS OF OVERBURDEN: 32 feet bgs				DATE HOLE: STARTED: 6/25/10 1210		FINISHED: 6/25/10 1306	
DEPTH DRILED INTO ROCK: n/a				ELEVATION TOP OF HOLE:			
TOTAL DEPTH OF HOLE: 32 feet bgs				TOTAL CORE RECOVERY: 0			
				SIGNATURE OF INSPECTOR:			


Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	SP		SANDY GRAVEL FILL, Poorly Graded, dry, nonplastic, dense, brown, 7.5YR 4/3			0		
			SILTY CLAY, semiplastic, medium stiff, dry, brown, 7.5YR 4/2	48/48		0		Waste encountered at 2 feet bgs. Cap thickness is 2 feet.
5						0		
	MSW			48/48		0		Plastic and glass in samples to 26 feet bgs.
10				12/48		0		
						0		
15	MSW		CLAYEY SILT, plastic, soft, dry, gray, 10YR 4/1	48/48		0		
						0		
20			CLAYEY SILT, semiplastic, medium stiff, moist, dark grey, 10 YR 4/1	48/48		0		
	MSW			48/48		0		
25						0		
				48/48		0		
30	ML		CLAYEY SILT, semiplastic, medium stiff, wet, very dark gray, 10YR 3/1.	48/48		0		Bottom of waste encountered at 26 feet bgs. Thickness of waste is 24 feet.
						0		

	Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: WB-4 (SHEET 1 OF 2)

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DRILLING LOG		DIVISION		INSTALLATION				SHEET 2 OF 2	
Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS	
30	ML			48/48		0		Bottom of hole at 32 feet bgs.	
35									
40									
45									
50									
55									
60									
65									

	Stell Environmental Enterprises, Inc 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: WB-4 (SHEET 2 OF 2)
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DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 2 1/4" OD Geoprobe		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: Tractor Mounted Geoprobe		
HOLE NUMBER: WB-5			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:	DISTURBED: 0	UNDISTURBED: 0
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Vertical			ELEVATION GROUND WATER: n/a		
THICKNESS OF OVERBURDEN: 24 feet bgs			DATE HOLE:	STARTED: 6/25/10 1500	FINISHED: 6/25/10 1713
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 24 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	SP		SANDY GRAVEL FILL, Poorly Graded, dry, nonplastic, dense, brown, 7.5YR 4/3			0		
2				48/48		0		Waste encountered at 2 feet bgs. Cap thickness is 2 feet.
5	MSW		SILTY CLAY, stiff, nonplastic, dry, dark yellow brown, 10 YR 4/4			0		
7						0		Trash, glass, and plastic in samples to 16 feet bgs.
10	MSW		As Above but reddish brown, 5YR 4/4	36/48		0		
12						0		
15	MSW		SILTY CLAY, medium stiff, plastic, moist, very dark gray, 2.5Y 3/1	24/48		0		Attempted 3 holes but hit refusal.
17				36/48		0		
20	ML		CLAYEY SILT, soft, plastic, wet, bluish gray, Gley 2 6/10B	48/48		0		Bottom of waste encountered at 16 feet bgs. Waste thickness is 14 feet.
22						0		
24				48/48		0		Bottom of hole at 24 feet bgs.
25								
30								



Stell Environmental Enterprises, Inc
25 East Main Street
Elverson, PA
Project # 03225

HOLE NUMBER: WB-5




(SHEET 1 OF 1)

DRILLING LOG		DIVISION		INSTALLATION		SHEET 1 OF 1	
PROJECT: Bellfort Landfill				SIZE AND TYPE OF BIT: 2 1/4" OD Geoprobe			
LOCATION: Houston, TX				DATUM FOR ELEVATION SHOWN:			
DRILLING AGENCY: Best Drilling Services				MANUFACTURERS DESIGNATION OR DRILL: Tractor Mounted Geoprobe			
HOLE NUMBER: WB-6				TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: 0		DISTURBED: 0 UNDISTURBED: 0	
NAME OF DRILLER: Sonny Tabolta				TOTAL NUMBER OF CORE BOXES: 0			
DIRECTION OF HOLE: Vertical				ELEVATION GROUND WATER: 17 feet bgs			
THICKNESS OF OVERBURDEN: 20 feet bgs				DATE HOLE: 6/24/10 1745		FINISHED: 6/24/10 1824	
DEPTH DRILED INTO ROCK: n/a				ELEVATION TOP OF HOLE:			
TOTAL DEPTH OF HOLE: 20 feet bgs				TOTAL CORE RECOVERY: 0			
				SIGNATURE OF INSPECTOR:			

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	SP		SANDY GRAVEL FILL, Poorly Graded, dry, nonplastic,dense, brown, 7.5YR 4/3			0		
			SILTY CLAY, dry, plastic, soft, dark brown, 10YR 3/2	36/48		0		Waste encountered at 2 feet bgs. Cap thickness is 2 feet.
5	MSW			36/48		0		Trash, glass, plastic, rubber and wood in samples to 12 feet bgs.
10	MSW		As Above but moist and dark gray 10YR 4/1	36/48		0		Bottom of waste encountered at 12 feet bgs. Waste thickness is 10 feet.
15	ML		CLAYEY SILT, soft,plastic,moist, very dark gray, 10YR 3/1	36/48		0		
	CL		SILTY CLAY, plastic,medium stiff,wet, gray, 7.5YR 5/1	48/48		0		Groundwater at 17 feet bgs.
20						0		Bottom of hole at 20 feet bgs.
25								
30								


	Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: WB-6 (SHEET 1 OF 1)

DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 2 1/4" OD Geoprobe		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: Tractor Mounted Geoprobe		
HOLE NUMBER: WB-7			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED: 0 UNDISTURBED: 0		
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Vertical			ELEVATION GROUND WATER: 8 feet bgs		
THICKNESS OF OVERBURDEN: 10 feet bgs			DATE HOLE: STARTED: 6/25/10 0825 FINISHED: 6/25/10 0845		
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 10 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	SP		SANDY GRAVEL FILL, Poorly Graded, dry, nonplastic, dense, brown, 7.5YR 4/3			0		
			CLAYEY SILT, medium stiff, plastic, dry, dark brown, 10YR 3/3	48/48		0		No waste encountered. No cap or waste thickness.
5	ML			48/48		0		
	ML		CLAYEY SILT, plastic, soft, wet, dark yellow brown, 10YR 3/4	24/24		0		Groundwater at 8 feet bgs Bottom of hole at 10 feet bgs.
10								
15								
20								
25								
30								

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DRILLING LOG		DIVISION		INSTALLATION				SHEET 1 OF 1	
PROJECT: Bellfort Landfill				SIZE AND TYPE OF BIT: 3" OD Shelby Tube with HSA					
LOCATION: Houston, TX				DATUM FOR ELEVATION SHOWN:					
DRILLING AGENCY: Best Drilling Services				MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Rig					
HOLE NUMBER: CB-1				TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0		UNDISTURBED: 0	
NAME OF DRILLER: Sonny Tabolita				TOTAL NUMBER OF CORE BOXES: 0					
DIRECTION OF HOLE: Vertical				ELEVATION GROUND WATER: n/a					
THICKNESS OF OVERBURDEN: 10 feet bgs				DATE HOLE:		STARTED: 6/22/10 1430		FINISHED: 6/22/10 1500	
DEPTH DRILED INTO ROCK: n/a				ELEVATION TOP OF HOLE:					
TOTAL DEPTH OF HOLE: 10 feet bgs				TOTAL CORE RECOVERY: 0					
				SIGNATURE OF INSPECTOR:					
Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS	
0	ML		CLAYEY SILT, plastic, soft, dry, very dark gray 7.5YR 3/1	24/24		0		No trash encountered. No cap or waste thickness.	
				24/24		0			
5	ML		CLAYEY SILT, plastic, soft, dry, gray 2.5Y 5/1 with orange mottles	24/24		0		Bottom of hole at 10 feet bgs.	
				24/24		0			
				24/24		0			
10									
15									
20									
25									
30									

	Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: CB-1 (SHEET 1 OF 1)
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

DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 3" OD Shelby Tube with HSA		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Rig		
HOLE NUMBER: CB-3			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED: 0 UNDISTURBED: 0		
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Vertical			ELEVATION GROUND WATER: n/a		
THICKNESS OF OVERBURDEN: 10 feet bgs			DATE HOLE: STARTED: 6/22/10 1315 FINISHED: 6/22/10 1350		
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 10 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	ML		CLAYEY SILT, plastic, soft, dry, brown, 10YR 4/3	24/24		0		No trash encountered. No cap or waste thickness.
			CLAYEY SILT, plastic, stiff, dry, very dark brown, 10YR 2/2	24/24		0		
5	ML			24/24		0		
				24/24		0		
10	ML		CLAYEY SILT, semiplastic, stiff, dry, brown. 10YR 4/3	24/24		0		Bottom of hole at 10 feet bgs.
15								
20								
25								
30								




	Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: CB-3 (SHEET 1 OF 1)
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DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: See Remarks Below		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Rig		
HOLE NUMBER: CB-4			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0 UNDISTURBED: 0
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Vertical			ELEVATION GROUND WATER: 9 feet bgs.		
THICKNESS OF OVERBURDEN: 10 feet bgs			DATE HOLE: 6/22/10 1130		FINISHED: 6/22/10 1220
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 10 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	CL		SILTY CLAY, semiplastic, stiff, dry, dark reddish brown, 5YR 3/3	24/24		0		2" OD Split Spoon 2' in Length with HSA. Switched to a 3" Shelby Tube, 2' in Length with HSA.
				24/24		0		No trash encountered. No cap or waste thickness.
5	CL		SILTY CLAY, nonplastic, very stiff, dry, very dark grayish brown, 10YR 3/2	24/24		0		
				24/24		0		
	ML		CLAYEY SILT, nonplastic, stiff, dry, very dark gray 10YR 3/1	24/24		0		
10	SM		SILTY SAND, well sorted, fine grained, nonplastic, soft, wet, dark gray, 10YR 4/1	24/24		0		Groundwater at 9 feet bgs. Bottom of hole at 10 feet bgs.
15								
20								
25								
30								

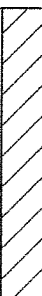

DRILLING LOG		DIVISION		INSTALLATION		SHEET 1 OF 1	
PROJECT: Belfort Landfill				SIZE AND TYPE OF BIT: 2" Geoprobe			
LOCATION: Houston, TX				DATUM FOR ELEVATION SHOWN:			
DRILLING AGENCY: Best Drilling Services				MANUFACTURERS DESIGNATION OR DRILL: Geoprobe Tractor Mounted			
HOLE NUMBER: CB-5				TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0 UNDISTURBED: 0	
NAME OF DRILLER: Sonny Tabolta				TOTAL NUMBER OF CORE BOXES: 0			
DIRECTION OF HOLE: Vertical				ELEVATION GROUND WATER: n/a			
THICKNESS OF OVERBURDEN: 10 feet bgs				DATE HOLE:		STARTED: 6/25/10 1035 FINISHED: 6/25/10 1055	
DEPTH DRILLED INTO ROCK: n/a				ELEVATION TOP OF HOLE:			
TOTAL DEPTH OF HOLE: 10 feet bgs				TOTAL CORE RECOVERY: 0			
				SIGNATURE OF INSPECTOR:			

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	CL		SILTY CLAY, semiplastic, stiff, dry, pale brown, 10YR 6/3	48/48		0		No trash encountered. No cap or waste thickness.
5	ML		CLAYEY SILT, semiplastic, medium stiff, dry, dark brown 10YR 3/3 with gray mottles	48/48		0		
10	ML		CLAYEY SILT, plastic, soft, wet, black, 10YR 2/1	24/24		0		
15								
20								
25								
30								






	Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: CB-5 (SHEET 1 OF 1)


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DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 2" Geoprobe		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: Geoprobe Tractor Mounted		
HOLE NUMBER: CB-6			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0 UNDISTURBED: 0
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Vertical			ELEVATION GROUND WATER: 7 feet bgs.		
THICKNESS OF OVERBURDEN: 10 feet bgs			DATE HOLE: 6/25/10 1420		FINISHED: 6/25/10 1515
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 10 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		






Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0			SILTY CLAY, semiplastic, medium stiff, dry, brown, 10YR 4/3	48/48		0		Hit refusal on first two attempts.
						0		No trash encountered. No cap or waste thickness.
5	CL					0		
				36/48		0	▼	Groundwater at 7 feet bgs.
10	ML		CLAYEY SILT, plastic, soft, wet, dark grayish brown, 10YR 4/2	24/24		0		Bottom of hole at 10 feet bgs.
15								
20								
25								
30								

DRILLING LOG		DIVISION		INSTALLATION		SHEET 1 OF 1	
PROJECT: Belfort Landfill				SIZE AND TYPE OF BIT: 2" Geoprobe			
LOCATION: Houston, TX				DATUM FOR ELEVATION SHOWN:			
DRILLING AGENCY: Best Drilling Services				MANUFACTURERS DESIGNATION OR DRILL: Geoprobe Tractor Mounted			
HOLE NUMBER: CB-7				TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0 UNDISTURBED: 0	
NAME OF DRILLER: Sonny Tabolta				TOTAL NUMBER OF CORE BOXES: 0			
DIRECTION OF HOLE: Vertical				ELEVATION GROUND WATER: n/a			
THICKNESS OF OVERBURDEN: 10 feet bgs				DATE HOLE:		STARTED: 6/24/10 1415 FINISHED: 6/24/10 1530	
DEPTH DRILED INTO ROCK: n/a				ELEVATION TOP OF HOLE:			
TOTAL DEPTH OF HOLE: 10 feet bgs				TOTAL CORE RECOVERY: 0			
				SIGNATURE OF INSPECTOR:			

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	CL		SILTY CLAY, semiplastic, medium stiff, dry, brown, 10YR 4/3			0		
			Small layer of crushed white stone.	36/48		0		
	CL		SILTY CLAY, semiplastic, medium stiff, dry, brown, 10YR 4/3			4.8		Trash, plastic, wood, and cloth encountered at 4 feet bgs. Cap thickness is 4 feet.
5			SILTY CLAY, plastic, soft, dry, reddish brown, 5YR 4/3	36/48		2.0		
	MSW			24/24		1.0		Bottom of hole at 10 feet bgs. Trash at bottom of hole.
10								
15								
20								
25								
30								


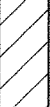

	Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: CB-7 (SHEET 1 OF 1)
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DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 3" OD Shelby Tube		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Rig		
HOLE NUMBER: CB-8			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: 0		DISTURBED: 0 UNDISTURBED: 0
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Vertical			ELEVATION GROUND WATER: n/a		
THICKNESS OF OVERBURDEN: 10 feet bgs			DATE HOLE: 6/23/10 1230		FINISHED: 6/23/10 1250
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 10 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	SM		SILTY SAND, fine grained, well sorted, medium stiff, dry, pale brown 10YR 6/3	12/24		0		
	SM		As above with traces of gravel.	18/24		0		
5	MSW		CLAYEY SILT, plastic, medium stiff, dry, 10YR 2/1	20/24		0		Trash, glass, and tar/charcoal odor encountered at 4 feet bgs. Cap thickness is 4 feet.
	MSW			20/24		0		
10	ML		CLAYEY SILT, plastic, soft, moist, dark gray 10YR 4/1	24/24		0		No trash encountered at 9 feet bgs. Waste thickness is 5 feet. Bottom of hole at 10 feet bgs.
15								
20								
25								
30								

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DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 2" OD Split Spoon		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Rig		
HOLE NUMBER: CB-09			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:	DISTURBED: 0	UNDISTURBED: 0
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Vertical			ELEVATION GROUND WATER: n/a		
THICKNESS OF OVERBURDEN: 10 feet bgs			DATE HOLE:	STARTED: 6/24/10 1720	FINISHED: 6/24/10 1735
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 10 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	CL		SILTY CLAY, traces of gravel, nonplastic, medium stiff, dry, reddish brown 5YR 4/3	14/24		0		
				16/24		0		
5	CL		SILTY CLAY, traces of gravel, plastic, medium stiff, moist, light brown, 5Y 6/1	19/24		0		
				18/24		0		
10	MSW		CLAYEY SILT, plastic, medium stiff, moist, black, 10YR 2/1	4/24		0		Trash, plastic, and railroad ties encountered at 8 feet bgs. Cap thickness is 8 feet. Bottom of hole at 10 feet bgs. Trash at bottom of hole.
15								
20								
25								
30								


	Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: CB-9 (SHEET 1 OF 1)
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DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 3" OD Shelby Tube		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Rig		
HOLE NUMBER: CB-11			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: 0		UNDISTURBED: 0
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Vertical			ELEVATION GROUND WATER: n/a		
THICKNESS OF OVERBURDEN: 10 feet bgs			DATE HOLE: 6/22/10 1515		FINISHED: 6/22/10 1550
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 10 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0			CLAYEY SILT, semiplastic, medium stiff, dry, very dark gray, 10YR 3/1	20/24		0		
ML				24/24		0		Few pieces of glass and plastic encountered between 2 and 3 feet. Cap thickness is 2 feet and waste thickness is 1 foot.
5			CLAYEY SILT, semiplastic, medium stiff, moist, gray with orange mottles, 10YR 3/1	24/24		0		
ML				24/24		0		
10				18/24		0		Bottom of hole at 10 feet bgs.
15								
20								
25								
30								







	Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: CB-11 (SHEET 1 OF 1)
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

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DRILLING LOG		DIVISION		INSTALLATION				SHEET 1 OF 1	
PROJECT: Bellfort Landfill				SIZE AND TYPE OF BIT: 3" OD Shelby Tube					
LOCATION: Houston, TX				DATUM FOR ELEVATION SHOWN:					
DRILLING AGENCY: Best Drilling Services				MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Rig					
HOLE NUMBER: CB-12				TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0		UNDISTURBED: 0	
NAME OF DRILLER: Sonny Tabolta				TOTAL NUMBER OF CORE BOXES: 0					
DIRECTION OF HOLE: Vertical				ELEVATION GROUND WATER: 6 feet bgs.					
THICKNESS OF OVERBURDEN: 10 feet bgs				DATE HOLE:		STARTED: 6/22/10 1630		FINISHED: 6/22/10 1700	
DEPTH DRILED INTO ROCK: n/a				ELEVATION TOP OF HOLE:					
TOTAL DEPTH OF HOLE: 10 feet bgs				TOTAL CORE RECOVERY: 0					
				SIGNATURE OF INSPECTOR:					
Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS	
0	ML		CLAYEY SILT, semiplastic, medium stiff, dry, gray 10YR 5/1 with red 7.5YR 4/3	18/24		0		Trash, metal peices, glass, and wood encountered at 1 feet bgs. Cap thickness is 1 foot.	
MSW				24/24		0			
5				24/24		0		Bottom of waste at 5 feet bgs. Waste thickness is 4 feet.	
ML				24/24		0		Groundwater at 6 feet bgs.	
ML			CLAYEY SILT, plastic, medium stiff, wet, brown 7.5YR 4/3 with gray 7.5YR 5/1 mottles.	24/24		0		Bottom of hole at 10 feet bgs.	
10									
15									
20									
25									
30									
			Stell Environmental Enterprises, Inc 25 East Main Street Elverson, PA Project # 03225			HOLE NUMBER: CB-12 (SHEET 1 OF 1)			

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DRILLING LOG		DIVISION		INSTALLATION				SHEET 1 OF 1	
PROJECT: Bellfort Landfill				SIZE AND TYPE OF BIT: 3" OD Shelby Tube					
LOCATION: Houston, TX				DATUM FOR ELEVATION SHOWN:					
DRILLING AGENCY: Best Drilling Services				MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Rig					
HOLE NUMBER: CB-13				TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0		UNDISTURBED: 0	
NAME OF DRILLER: Sonny Tabolta				TOTAL NUMBER OF CORE BOXES: 0					
DIRECTION OF HOLE: Vertical				ELEVATION GROUND WATER: 9 feet bgs.					
THICKNESS OF OVERBURDEN: 10 feet bgs				DATE HOLE:		STARTED: 6/23/10 0910		FINISHED: 6/23/10 0935	
DEPTH DRILED INTO ROCK: n/a				ELEVATION TOP OF HOLE:					
TOTAL DEPTH OF HOLE: 10 feet bgs				TOTAL CORE RECOVERY: 0					
				SIGNATURE OF INSPECTOR:					
Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS	
0	CL		SILTY CLAY, nonplastic, loose, dry & crumbly, gray, 10YR 5/1	20/24		0			
				18/24		0		Plastic trash encountered at 2 feet bgs. Cap thickness is 2 feet.	
	MSW			10/24		0			
5								Bottom of waste at 6 feet bgs. Waste thickness is 4 feet.	
	ML		CLAYEY SILT, plastic, stiff, moist, dark gray, 10YR 4/1	24/24		0		Groundwater at 9 feet bgs.	
				24/24		0		Bottom of hole at 10 feet bgs.	
10	SC		CLAYEY SAND, semiplastic, medium stiff, wet, gray, 2.5Y 5/1						
15									
20									
25									
30									
			Stell Environmental Enterprises, Inc 25 East Main Street Elverson, PA Project # 03225				HOLE NUMBER: CB-13 (SHEET 1 OF 1)		

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


DRILLING LOG		DIVISION		INSTALLATION				SHEET 1 OF 1	
PROJECT: Bellfort Landfill				SIZE AND TYPE OF BIT: 2" OD Split Spoon					
LOCATION: Houston, TX				DATUM FOR ELEVATION SHOWN:					
DRILLING AGENCY: Best Drilling Services				MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Rig					
HOLE NUMBER: CB-15				TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0		UNDISTURBED: 0	
NAME OF DRILLER: Sonny Tabolta				TOTAL NUMBER OF CORE BOXES: 0					
DIRECTION OF HOLE: Vertical				ELEVATION GROUND WATER: n/a					
THICKNESS OF OVERBURDEN: 10 feet bgs				DATE HOLE:		STARTED: 6/24/10 1030		FINISHED: 6/24/10 1135	
DEPTH DRILED INTO ROCK: n/a				ELEVATION TOP OF HOLE:					
TOTAL DEPTH OF HOLE: 10 feet bgs				TOTAL CORE RECOVERY: 0					
				SIGNATURE OF INSPECTOR:					
Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS	
0	SM		SILTY SAND FILL, loose, nonplastic, dry & crumbly, brown, 7.5YR 4/3	10/24		0		Plastic trash and cloth encountered at 4 feet bgs. Cap thickness is 4 feet. 4.6% methane detected and 75% methane detected. Stopped rig for 15 minutes. Bottom of hole at 10 feet bgs. Trash in bottom of boring.	
5	MSW		SILTY CLAY, semiplastic, soft, dry & crumbly, brown, 10YR 4/3	10/24		0			
	MSW		As above but with black soft "tar balls"	12/24		0			
	MSW		SILTY CLAY, semiplastic, soft, dry & crumbly, dark gray 10YR 3/1	12/24		0			
10									
15									
20									
25									
30									
			Stell Environmental Enterprises, Inc 25 East Main Street Elverson, PA Project # 03225				HOLE NUMBER: CB-15 (SHEET 1 OF 1)		

DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 2" OD Split Spoon		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Rig		
HOLE NUMBER: CB-16			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED: 0 UNDISTURBED: 0		
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Vertical			ELEVATION GROUND WATER: n/a		
THICKNESS OF OVERBURDEN: 6 feet bgs			DATE HOLE: STARTED: 6/24/10 1145 FINISHED: 6/24/10 1534		
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 6 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0			SILTY SAND FILL, loose, nonplastic, dry & crumbly, dark brown, 10YR 3/3	12/24		0		
5	SM			18/24		0		Concrete refusal at 6 feet bgs. Tried 6 other holes and all had the same result. can assume waste starts at 6 feet bgs. Cap thickness is 6 feet.
				24/24		0		Bottom of hole at 6 feet bgs.
10								
15								
20								
25								
30								

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DRILLING LOG		DIVISION		INSTALLATION				SHEET 1 OF 1	
PROJECT: Belfort Landfill				SIZE AND TYPE OF BIT: 2" OD Geoprobe					
LOCATION: Houston, TX				DATUM FOR ELEVATION SHOWN:					
DRILLING AGENCY: Best Drilling Services				MANUFACTURERS DESIGNATION OR DRILL: Geoprobe Tractor Mounted					
HOLE NUMBER: CB-17				TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:		DISTURBED: 0		UNDISTURBED: 0	
NAME OF DRILLER: Sonny Tabolta				TOTAL NUMBER OF CORE BOXES: 0					
DIRECTION OF HOLE: Vertical				ELEVATION GROUND WATER: 9 feet bgs.					
THICKNESS OF OVERBURDEN: 10 feet bgs				DATE HOLE:		STARTED: 6/25/10 0910		FINISHED: 6/25/10 0930	
DEPTH DRILLED INTO ROCK: n/a				ELEVATION TOP OF HOLE:					
TOTAL DEPTH OF HOLE: 10 feet bgs				TOTAL CORE RECOVERY: 0					
				SIGNATURE OF INSPECTOR:					
Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS	
0	SM		SILTY SAND FILL, loose, nonplastic, dry & crumbly, dark brown, 10YR 3/3			0		Trash, plastic and wood encountered at 3 feet bgs. Cap thickness is 3 feet.	
	CL		SILTY CLAY, semiplastic, medium stiff, dry, dark brown 10YR 3/3	48/48		0			
5	MSW			24/48		0			
10	MSW		CLAYEY SILT, plastic, soft, wet, dark yellowish brown, 10YR 4/4	24/24		0		Groundwater at 9 feet bgs. Bottom of hole at 10 feet bgs. Trash in bottom of hole.	
15									
20									
25									
30									
			Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225				HOLE NUMBER: CB-17 (SHEET 1 OF 1)		


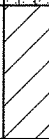


DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 2" OD Split Spoon with HSA		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: CME Truck Mounted Rotary Rig		
HOLE NUMBER: CB-18			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: 0 DISTURBED: 0 UNDISTURBED: 0		
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Vertical			ELEVATION GROUND WATER: n/a		
THICKNESS OF OVERBURDEN: 10 feet bgs			DATE HOLE: 6/24/10 1415 STARTED: 6/24/10 1415 FINISHED: 6/24/10 1450		
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 10 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	SM		SILTY SAND FILL, loose, nonplastic, dry & crumbly, dark brown, 10YR 3/3	24/24		0		
3			SILTY CLAY, plastic, medium stiff, dry, dark brown, 10YR 3/3	20/24		0		Trash, glass, plastic and metal encountered at 3 feet bgs. Cap thickness is 3 feet.
5				20/24		0		
7	MSW			24/24		0		
10				8/24		0		Bottom of hole at 10 feet bgs. Trash in bottom of hole.
15								
20								
25								
30								

	Stell Environmental Enterprises, Inc. 25 East Main Street Elverson, PA Project # 03225	HOLE NUMBER: CB-18 (SHEET 1 OF 1)
	<i>...The Difference!</i>	

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DRILLING LOG		DIVISION	INSTALLATION		SHEET 1 OF 1
PROJECT: Bellfort Landfill			SIZE AND TYPE OF BIT: 2" OD Geoprobe		
LOCATION: Houston, TX			DATUM FOR ELEVATION SHOWN:		
DRILLING AGENCY: Best Drilling Services			MANUFACTURERS DESIGNATION OR DRILL: Geoprobe Tractor Mounted		
HOLE NUMBER: CB-19			TOTAL NO. OF OVERBURDEN SAMPLES TAKEN:	DISTURBED: 0	UNDISTURBED: 0
NAME OF DRILLER: Sonny Tabolta			TOTAL NUMBER OF CORE BOXES: 0		
DIRECTION OF HOLE: Vertical			ELEVATION GROUND WATER: 8 feet bgs.		
THICKNESS OF OVERBURDEN: 10 feet bgs			DATE HOLE:	STARTED: 6/25/10 0945	FINISHED: 6/25/10 1015
DEPTH DRILED INTO ROCK: n/a			ELEVATION TOP OF HOLE:		
TOTAL DEPTH OF HOLE: 10 feet bgs			TOTAL CORE RECOVERY: 0		
			SIGNATURE OF INSPECTOR:		

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Recovery (in.)	Box or Sampling No.	PID	Water Level	REMARKS
0	SM		SILTY SAND FILL, loose, nonplastic, dry & crumbly, dark brown, 10YR 3/3			0		
	CL		SILTY CLAY, nonplastic, stiff, dry, grayish brown, 10YR 5/2	48/48		0		
5	ML		CLAYEY SILT, plastic, medium stiff, moist, gray, 10YR 5/1	48/48		0		
	MSW			12/24		0		Trash and plastic encountered at 7 feet bgs. Cap thickness is 7 feet. Groundwater at 8 feet bgs. Bottom of hole at 10 feet bgs. Trash in bottom of hole.
10								
15								
20								
25								
30								

Boring Log Legend

ML - Clayey Silt

CL - Silty Clay

SM – Silty Sand

MSW – Municipal Solid Waste

SC- Sandy Clay

7.5YR 4/3 – Descriptive color value from Munsell color chart.

APPENDIX C
MONITORING WELL INSTALLATION LOGS AND
WELL DEVELOPMENT RECORDS

WELL CONSTRUCTION DIAGRAM

Page 1 of 1

Project #: <u>03225-02</u>		Project Name: <u>Bellport Street Landfill</u>		Boring Well #: <u>MW-06</u>	
Geologist: <u>Tim Swavely</u>		Driller/Company: <u>Sonny / Best Drilling</u>			
Drilling Equip.: <u>CME Model 75 Truck Mounted</u>		Date Start: <u>6/23/10</u>		Date Completed: <u>6/23/10</u>	
Surface Elev.: _____		Top of Casing Elev.: _____		Total Depth: <u>25 ft. bgs</u>	
				Well Depth: <u>25 ft. bgs</u>	

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation _____ ft. MSL

B. Well casing, top elevation _____ ft. MSL

C. Land surface elevation _____ ft. MSL

D. Surface seal, bottom 5 ft. TOC or _____ ft. MSL

16. USCS classification of soil near screen:

GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐

SM ☐ SC ☐ ML ☐ MH ☐ CL ☒ CH ☐

Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☒ No

18. Drilling method used: Rotary ☐

Hollow Stem Auger ☒

Other ☐

19. Drilling fluid used: Water ☐ Air ☐

Drilling Mud ☐ None ☒

20. Drilling additives used? ☐ Yes ☒ No

Describe _____

21. Source of water (attach analysis): _____

E. Secondary filter, top N/A ft. TOC or _____ ft. MSL

F. Bentonite seal, top 14 ft. TOC or _____ ft. MSL

G. Secondary filter, top N/A ft. TOC or _____ ft. MSL

H. Primary filter, top 16 ft. TOC or _____ ft. MSL

I. Screen joint, top 18 ft. TOC or _____ ft. MSL

J. Well bottom 23 ft. TOC or _____ ft. MSL

K. Filter pack, bottom 28 ft. TOC or _____ ft. MSL

L. Borehole, bottom 28 ft. TOC or _____ ft. MSL

M. Borehole, diameter 8.25 in.

N. O.D. well casing 2.25 in.

O. I.D. well casing 2.0 in.

25 P. 24 hr. water level after completion 23.65 in. TOC or _____ in. MSL

1. Cap and lock? ☒ Yes ☐ No

2. Protective posts? ☐ Yes ☒ No

3. Protective casing:

a. Inside diameter: 3.75 in.

a. Length: 5.0 ft.

4. Drainage port(s): ☐ Yes ☒ No

5. Surface seal:

a. Cap _____

Gravel blanket ☐

Bentonite ☐

Concrete ☒

Other ☐

b. Annular space seal: _____

Bentonite ☐

Cement ☒

Other ☐

6. Material between well casing and protective casing: _____

Bentonite ☐

Cement ☒

Other ☐

7. Annular space seal:

a. Granular Bentonite ☐

b. _____ Lbs/gal mud weight.. Bentonite-sand slurry ☐

c. _____ Lbs/gal mud weight.... Bentonite-slurry ☐

d. _____ x Bentonite..... Bentonite-cement grout ☒

e. 117 yd.³ volume added for any of the above

f. How installed: _____

Tremie ☐

Tremie pumped ☐

Gravity ☒

8. Centralizers ☐ Yes ☒ No

9. Secondary Filter ☐ Yes ☒ No

a. Volume added _____ yd.³ _____ Bags/Size

10. Bentonite seal:

a. Bentonite pellets ☐

b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☒

c. _____ Other ☐

11. Secondary Filter ☐ Yes ☒ No

a. Volume added _____ yd.³ _____ Bags/Size

12. Filter pack material: Manufacturer, product name & mesh size:

a. Unimin, Silica Sand, 20/40

b. Volume added 0.175 yd.³ 7150 lb. Bags/Size

13. Well casing: Flush threaded PVC schedule 40 ☒

Flush threaded PVC schedule 80 ☐

Other ☐

14. Screen material: PVC

a. Screen type: _____

Factory cut ☒

Continuous slot ☐

Other ☐

b. Manufacturer Gault Court Manufacturing Equip.

c. Slot size: 0.010 in.

d. Slotted length: 1.0 in.

15. Backfill material (below filter pack): _____

None ☒

Other ☐

WELL CONSTRUCTION DIAGRAM

Page 1 of 1

Project #: 03225.02

Project Name: Bellfont Street Landfill

Boring Well #: MW-02R

Geologist: Tim Savely

Driller/Company: Sunny 1 Best Drilling

Drilling Equip.: CONE Truck Mounted Model 75

Date Start: 6/21/10

Date Completed: 6/21/10

Surface Elev.: _____

Top of Casing Elev.: _____

Total Depth: 55 ft 6 in

Well Depth: 55 ft 6 in

Depth (bgs) Note: Use top of casing (TOC) for all depth measurements.

- A. Protective casing, top elevation _____ ft. MSL
- B. Well casing, top elevation _____ ft. MSL
- C. Land surface elevation _____ ft. MSL
- D. Surface seal, bottom 6 ft. TOC or _____ ft. MSL

16. USCS classification of soil near screen:

GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
 SM ☐ SC ☐ ML ☐ MH ☐ CL ☒ CH ☐
 Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☒ No

18. Drilling method used: Rotary ☐
 Hollow Stem Auger ☒
 Other ☐

19. Drilling fluid used: Water ☐ Air ☐
 Drilling Mud ☐ None ☒

20. Drilling additives used? ☐ Yes ☒ No
 Describe _____

21. Source of water (attach analysis):

1. Cap and lock? ☒ Yes ☐ No
 2. Protective posts? ☐ Yes ☒ No

3. Protective casing:
 a. Inside diameter: 3.75 in.
 a. Length: 5.0 ft.

4. Drainage port(s): ☐ Yes ☒ No

5. Surface seal:
 a. Cap Gravel blanket ☐
 Bentonite ☐
 Concrete ☒
 Other ☐

b. Annular space seal: Bentonite ☐
 Cement ☒
 Other ☐

6. Material between well casing and protective casing:
 Bentonite ☐
 Cement ☒
 Other ☐

7. Annular space seal:
 a. Granular Bentonite ☐
 b. _____ Lbs/gal mud weight.. Bentonite-sand slurry ☐
 c. _____ Lbs/gal mud weight.... Bentonite-slurry ☐
 d. _____ x Bentonite..... Bentonite-cement grout ☒
 e. 5.0 yd.³ volume added for any of the above
 f. How installed: Tremie ☐
 Tremie pumped ☐
 Gravity ☒

8. Centralizers ☐ Yes ☒ No

9. Secondary Filter ☐ Yes ☒ No
 a. Volume added _____ yd.³ Bags/Size

10. Bentonite seal:
 a. Bentonite pellets ☒
 b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☒
 c. _____ Other ☐

11. Secondary Filter ☐ Yes ☒ No
 a. Volume added _____ yd.³ Bags/Size

12. Filter pack material: Manufacturer, product name & mesh size:
 a. Unimin, Silica Sand 20/40
 b. Volume added 0.175 yd.³ Bags/Size

13. Well casing: Flush threaded PVC schedule 40 ☒
 Flush threaded PVC schedule 80 ☐
 Other ☐

14. Screen material: PVC
 a. Screen type: Factory cut ☒
 Continuous slot ☐
 Other ☐

b. Manufacturer Gulf Coast Manufacturing Equip
 c. Slot size: 0.010 in.
 d. Slotted length: 6.0 in.

15. Backfill material (below filter pack): None ☒
 Other ☐

E. Secondary filter, top N/A ft. TOC or _____ ft. MSL

F. Bentonite seal, top 45 ft. TOC or _____ ft. MSL

G. Secondary filter, top N/A ft. TOC or _____ ft. MSL

H. Primary filter, top 47 ft. TOC or _____ ft. MSL

I. Screen joint, top 49 ft. TOC or _____ ft. MSL

J. Well bottom 59 ft. TOC or _____ ft. MSL

K. Filter pack, bottom 59 ft. TOC or _____ ft. MSL

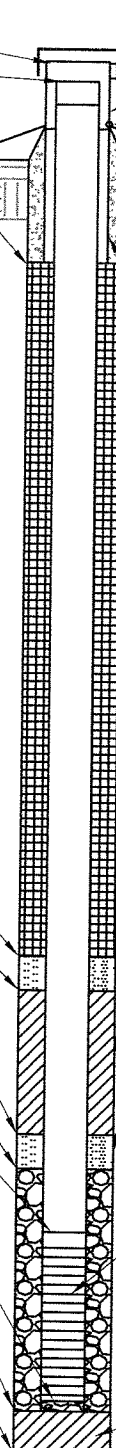
L. Borehole, bottom 59 ft. TOC or _____ ft. MSL

M. Borehole, diameter 8.25 in.

N. O.D. well casing 2.25 in.

O. I.D. well casing 2.0 in.

55 P. 24 hr. water level after completion 14.82 in. TOC or _____ in. MSL



WELL CONSTRUCTION DIAGRAM

Page 1 of 1

Project #: <u>03225.02</u>		Project Name: <u>Bellfont Street Landfill</u>		Boring Well #: <u>MW-07</u>	
Geologist: <u>Tim Swavely</u>		Driller/Company: <u>Sonny / Best Drilling</u>			
Drilling Equip.: <u>CME Model 75 Truck Mounted</u>		Date Start: <u>6/22/10</u>		Date Completed: <u>6/22/10</u>	
Surface Elev.: _____		Top of Casing Elev.: _____		Total Depth: <u>25 ft. bgs</u>	
Well Depth: <u>25 ft. bgs</u>					

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation _____ ft. MSL

B. Well casing, top elevation _____ ft. MSL

C. Land surface elevation _____ ft. MSL

D. Surface seal, bottom 5.0 ft. TOC or _____ ft. MSL

16. USCS classification of soil near screen:

GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐

SM ☐ SC ☒ ML ☐ MH ☐ CL ☐ CH ☐

Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☒ No

18. Drilling method used: Rotary ☐

Hollow Stem Auger ☒

Other ☐

19. Drilling fluid used: Water ☐ Air ☐

Drilling Mud ☐ None ☒

20. Drilling additives used? ☐ Yes ☒ No

Describe _____

21. Source of water (attach analysis): _____

1. Cap and lock? ☒ Yes ☐ No
2. Protective posts? ☐ Yes ☒ No
3. Protective casing:
 - a. Inside diameter: 3.75 in.
 - a. Length: 5.0 ft.
4. Drainage port(s): ☐ Yes ☒ No
5. Surface seal:
 - a. Cap Gravel blanket ☐
 - Bentonite ☐
 - Concrete ☒
 - Other ☐
 - b. Annular space seal: Bentonite ☐
 - Cement ☒
 - Other ☐
6. Material between well casing and protective casing:
 - Bentonite ☐
 - Cement ☒
 - Other ☐
7. Annular space seal:
 - a. Granular Bentonite ☐
 - b. _____ Lbs/gal mud weight.. Bentonite-sand slurry ☐
 - c. _____ Lbs/gal mud weight.... Bentonite-slurry ☐
 - d. _____ x Bentonite..... Bentonite-cement grout ☒
 - e. 10 yd.³ volume added for any of the above
 - f. How installed: Tremie ☐
 - Tremie pumped ☐
 - Gravity ☒
8. Centralizers ☐ Yes ☒ No
9. Secondary Filter ☐ Yes ☒ No
 - a. Volume added _____ yd.³ Bags/Size
10. Bentonite seal:
 - a. Bentonite pellets ☒
 - b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☒
 - c. _____ Other ☐
11. Secondary Filter ☐ Yes ☒ No
 - a. Volume added _____ yd.³ Bags/Size
12. Filter pack material: Manufacturer, product name & mesh size:
 - a. Unimin Silica Sand 20/40
 - b. Volume added 0.75 yd.³ 7/50 Bags/Size
13. Well casing: Flush threaded PVC schedule 40 ☒
- Flush threaded PVC schedule 80 ☐
- Other ☐
14. Screen material: PVC
 - a. Screen type: Factory cut ☒
 - Continuous slot ☐
 - Other ☐
 - b. Manufacturer Gulf Coast Mining Equip.
 - c. Slot size: 0.010 in.
 - d. Slotted length: 1.0 in.
15. Backfill material (below filter pack): None ☒
- Other ☐

E. Secondary filter, top N/A ft. TOC or _____ ft. MSL

F. Bentonite seal, top 15.0 ft. TOC or _____ ft. MSL

G. Secondary filter, top N/A ft. TOC or _____ ft. MSL

H. Primary filter, top 17.0 ft. TOC or _____ ft. MSL

I. Screen joint, top 19.0 ft. TOC or _____ ft. MSL

J. Well bottom 29.0 ft. TOC or _____ ft. MSL

K. Filter pack, bottom 29.0 ft. TOC or _____ ft. MSL

L. Borehole, bottom 29.0 ft. TOC or _____ ft. MSL

M. Borehole, diameter 8.25 in.

N. O.D. well casing 2.25 in.

O. I.D. well casing 2.0 in.

P. 24 hr. water level after completion 10.51 in. TOC or _____ in. MSL

WELL CONSTRUCTION DIAGRAM

Page 1 of 1

Project #: <u>03225.02</u>		Project Name: <u>Bellfont Street Landfill</u>		Boring Well #: <u>MW-04R</u>	
Geologist: <u>Tim Swatchy</u>			Driller/Company: <u>Sunny / Best Drilling</u>		
Drilling Equip.: <u>CME Model 75 Truade Mounted</u>			Date Start: <u>6/2/10</u>		Date Completed: <u>6/2/10</u>
Surface Elev.: _____		Top of Casing Elev.: _____		Total Depth: <u>35 ft. 6 in.</u>	
				Well Depth: <u>35 ft. 6 in.</u>	

Depth (bgs) _____

Note: Use top of casing (TOC) for all depth measurements.

A. Protective casing, top elevation _____ ft. MSL

B. Well casing, top elevation _____ ft. MSL

C. Land surface elevation _____ ft. MSL

D. Surface seal, bottom 6 ft. TOC or _____ ft. MSL

16. USCS classification of soil near screen:

GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐

SM ☐ SC ☐ ML ☐ MH ☐ CL ☒ CH ☐

Bedrock ☐

17. Sieve analysis attached? ☐ Yes ☒ No

18. Drilling method used: Rotary ☐
Hollow Stem Auger ☒
Other ☐

19. Drilling fluid used: Water ☐ Air ☐
Drilling Mud ☐ None ☒

20. Drilling additives used? ☐ Yes ☒ No
Describe _____

21. Source of water (attach analysis): _____

E. Secondary filter, top N/A ft. TOC or _____ ft. MSL

F. Bentonite seal, top 25 ft. TOC or _____ ft. MSL

G. Secondary filter, top N/A ft. TOC or _____ ft. MSL

H. Primary filter, top 27 ft. TOC or _____ ft. MSL

I. Screen joint, top 29 ft. TOC or _____ ft. MSL

J. Well bottom 39 ft. TOC or _____ ft. MSL

K. Filter pack, bottom 39 ft. TOC or _____ ft. MSL

L. Borehole, bottom 39 ft. TOC or _____ ft. MSL

M. Borehole, diameter 8.25 in.

N. O.D. well casing 2.25 in.

O. I.D. well casing 2.0 in.

35 P. 24 hr. water level after completion 12.76 in. TOC or _____ in. MSL

1. Cap and lock? ☒ Yes ☐ No

2. Protective posts? ☐ Yes ☒ No

3. Protective casing:
a. Inside diameter: 7.75 in.
a. Length: 5.0 ft.

4. Drainage port(s): ☐ Yes ☒ No

5. Surface seal:
a. Cap _____
Gravel blanket ☐
Bentonite ☐
Concrete ☒
Other ☐
b. Annular space seal: _____
Bentonite ☐
Cement ☒
Other ☐

6. Material between well casing and protective casing: _____
Bentonite ☐
Cement ☒
Other ☐

7. Annular space seal:
a. Granular Bentonite ☐
b. _____ Lbs/gal mud weight.. Bentonite-sand slurry ☐
c. _____ Lbs/gal mud weight.... Bentonite-slurry ☐
d. _____ x Bentonite..... Bentonite-cement grout ☒
e. 2.46 yd.³ volume added for any of the above
f. How installed: _____
Tremie ☐
Tremie pumped ☐
Gravity ☒

8. Centralizers ☐ Yes ☒ No

9. Secondary Filter ☐ Yes ☒ No
a. Volume added _____ yd.³ _____ Bags/Size

10. Bentonite seal:
a. Bentonite pellets ☐
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☒
c. _____ Other ☐

11. Secondary Filter ☐ Yes ☒ No
a. Volume added _____ yd.³ _____ Bags/Size

12. Filter pack material: Manufacturer, product name & mesh size:
a. Unimin, Silica Sand, 20/40
b. Volume added 0.196 yd.³ 8150 Bags/Size

13. Well casing: Flush threaded PVC schedule 40 ☒
Flush threaded PVC schedule 80 ☐
Other ☐

14. Screen material: PVC
a. Screen type: _____
Factory cut ☒
Continuous slot ☐
Other ☐
b. Manufacturer Gulf Coast Monitoring Equip
c. Slot size: 0.010 in.
d. Slotted length: 1.0 in.

15. Backfill material (below filter pack): _____
None ☒
Other ☐

WELL DEVELOPMENT RECORD

WELL DESIGNATION: MW-07

DATE(S) OF INSTALLATION: 6/22/10

SITE GEOLOGIST: Timothy Swartz

DATE(S) OF DEVELOPMENT: 6/25/10

STATIC WATER LEVELS: BEFORE DEVELOPMENT 9.6 Feet DATE 6/25/10
(FROM TOP OF CASING)

24 HRS. AFTER DEVEL. _____ DATE _____

DEPTH TO SEDIMENT: BEFORE DEVELOPMENT 15.4 Feet DATE 6/25/10
(FROM TOP OF CASING)

24 HRS. AFTER DEVEL. _____ DATE _____

DEPTH TO WELL BOTTOM: 25 Feet
(FROM TOP OF CASING)

QUANTITY OF MUD/WATER (gallons):

LOST DURING DRILLING _____

REMOVED PRIOR TO WELL INSERTION _____

LOST d/THICK FLUID DISPLACEMENT _____

ADDED d/FILTER PACK REPLACEMENT _____

(a) water column (ft.) 5.8

(b) well diameter (in.) 2.25 OD

(c) screen length (ft.) 10

(d) borehole diameter (in.) 8.25

(e) annulus space/length (ft) 6

QUANTITY OF FLUID STANDING IN WELL 5.33 gallons

QUANTITY OF FLUID IN ANNULUS _____ gallons

TOTAL QTY. ³~~(5)~~ equivalent volumes) 15.99 gal

TOTAL QTY. (5 times losses) _____

TOTAL
DEVEL.
VOLUME
REQ'D 15.99 gallons

TYPE AND SIZE OF PUMP: _____

TYPE AND SIZE OF BAILER: _____

DESCRIPTION OF SURGE TECHNIQUE, IF ANY: _____

TYPICAL PUMPING RATE 1.5 gal/min GAL/HR EST. RECHARGE RATE 90 gal/hr

TOTAL QUANTITY OF WATER REMOVED 82.5 gal TIME REQUIRED 55 min

SIGNATURE OF SITE GEOLOGIST Timothy Swartz

Project: Bellfort landfill

7-22-67

Geol. Dist.

$$.73 \times 6 = 4.38$$

$$.1632 \times 5.8 = 0.95$$
$$\frac{5.33 \times 3}{15.99 \text{ gal}}$$
[illegible]

WELL DEVELOPMENT RECORD

WELL DESIGNATION: MW-4R DATE(S) OF INSTALLATION: 6/21/10

SITE GEOLOGIST: Tim Smalley DATE(S) OF DEVELOPMENT: 6/25/10

STATIC WATER LEVELS: BEFORE DEVELOPMENT 12.26' Seet DATE 6/25/10
(FROM TOP OF CASING)

24 HRS. AFTER DEVEL. _____ DATE _____

DEPTH TO SEDIMENT: BEFORE DEVELOPMENT 26.54' Seet DATE 6/25/10
(FROM TOP OF CASING)

24 HRS. AFTER DEVEL. _____ DATE _____

DEPTH TO WELL BOTTOM: ^{KN3}
(FROM TOP OF CASING) ~~38.8'~~ 39 Seet

QUANTITY OF MUD/WATER (gallons):

LOST DURING DRILLING _____

REMOVED PRIOR TO WELL INSERTION _____

LOST d/THICK FLUID DISPLACEMENT _____

ADDED d/FILTER PACK REPLACEMENT _____

(a) water column (ft.) 14.28 (b) well diameter (in.) 2.25 OD

(c) screen length (ft.) 10 (d) borehole diameter (in.) 8.25

(e) annulus space/length (ft) 6

QUANTITY OF FLUID STANDING IN WELL 6.71 gallons

QUANTITY OF FLUID IN ANNULUS _____ gallons

TOTAL QTY. ³
(~~3~~ equivalent volumes) 20.13

TOTAL QTY. (5 times losses) _____

TOTAL
DEVEL.
VOLUME
REQ'D 20.13 gallons

TYPE AND SIZE OF PUMP: _____

TYPE AND SIZE OF BAILER: _____

DESCRIPTION OF SURGE TECHNIQUE, IF ANY: _____

TYPICAL PUMPING RATE 1.25 GAL/HR EST. RECHARGE RATE 75 gal/hr

TOTAL QUANTITY OF WATER REMOVED 27.50 gal TIME REQUIRED 22 min

SIGNATURE OF SITE GEOLOGIST Tim Smalley

$$.1632 \times 14.28 = 2.33$$
$$\underline{6.71 \times 3 = 20.13 \text{ gal}}$$
Page 1 of 1

Project: Bellfort Landfill

Wei: MW-412

Geologist:

[illegible]

WELL DEVELOPMENT RECORD

WELL DESIGNATION: MW-2R

DATE(S) OF INSTALLATION: 6/21/10

SITE GEOLOGIST: Timothy Swartz

DATE(S) OF DEVELOPMENT: 6/26/10

STATIC WATER LEVELS: BEFORE DEVELOPMENT 15.1 Feet DATE 6/26/10
(FROM TOP OF CASING)

24 HRS. AFTER DEVEL. _____ DATE _____

DEPTH TO SEDIMENT: BEFORE DEVELOPMENT 59.6 Feet DATE 6/26/10
(FROM TOP OF CASING)

24 HRS. AFTER DEVEL. _____ DATE _____

DEPTH TO WELL BOTTOM: 59 Feet
(FROM TOP OF CASING)

QUANTITY OF MUD/WATER (gallons):

LOST DURING DRILLING _____

REMOVED PRIOR TO WELL INSERTION _____

LOST d/THICK FLUID DISPLACEMENT _____

ADDED d/FILTER PACK REPLACEMENT _____

(a) water column (ft.) 44.5 (b) well diameter (in.) ~~2.00~~ 2.25 00

(c) screen length (ft.) 10 (d) borehole diameter (in.) 8.25

(e) annulus space/length (ft) 6

QUANTITY OF FLUID STANDING IN WELL 11.64 gallons

QUANTITY OF FLUID IN ANNULUS _____ gallons

TOTAL QTY. ³~~(5)~~ equivalent volumes) 34.93 gal

TOTAL QTY. (5 times losses) _____

TOTAL
DEVEL.
VOLUME
REQ'D 34.93 gallons

TYPE AND SIZE OF PUMP: _____

TYPE AND SIZE OF BAILER: _____

DESCRIPTION OF SURGE TECHNIQUE, IF ANY: _____

TYPICAL PUMPING RATE 0.5 gal/min GAL/HR EST. RECHARGE RATE ³⁰~~3.5~~ gal hr
KNIP

TOTAL QUANTITY OF WATER REMOVED 40.5 gal TIME REQUIRED 1 hr 50 min

SIGNATURE OF SITE GEOLOGIST Timothy Swartz

Project: Bellfort Landfill

Well: MW-02R

Geologist: _____

$$.73 \times 6 = 4.38$$

$$.1632 \times 44.5 = 7.26$$

$$11.64 \times 3 = 34.93 \text{ gal}$$

Date	Time	Pump On/Off	Flow Rate (gal/min)	Quantity Removed (gallons)	Depth to Water (ft TOC)	pH	Cond (µS/cm)	DO (mg/L)	Temp (°C)	Turbidity (NTU)	Redox Potential (En) (mV)	Appearance	Comments
6/25/10	1735	on	1	1	35.7'	7.45	4.07	1.36	23.59	352	-2	Brown Cloudy	
6/25/10	1740	on	1	5									
6/25/10	1745	on	4.5	10	40.2	7.29			23.69	239			
6/26/10	0820	on	0.5	0.0	35.70'	7.85	4.42	0.96	24.01	54	-81	semi-clear	
6/26/10	0825	on	0.5	2.5	49.53	7.65	4.39	1.38	23.32	155	-68		
6/26/10	0835	on	0.5	7.5	53.10'	7.48	4.67	0.97	23.07	—	-86	cloudy	
6/26/10	0845	on	0.5	13	55.50'	7.32	4.07	0.45	22.91	—	-78	cloudy	Turned pump off for 15 min
6/26/10	0900	off	0.5	13	52.69	7.62	4.02	2.48	23.66	—	-60	cloudy	
6/26/10	0910	on	0.5	18	56.18	7.69	4.53	3.86	23.51	—	-23	cloudy	
6/26/10	0920	on	0.5	23	57.39	7.64	4.45	3.30	23.49	—	20	cloudy	Turned pump off for 15 min
	0935	on	0.5	23	51.15	7.69	4.50	2.24	22.91	—	19	"	
	0945	on	0.5	28	54.70	7.57	4.41	2.71	23.22	212	29	semi clear	
	0950	on	0.5	30.5	55.45	7.51	4.46	2.21	23.41	141	6	"	
	0955	on	0.5	33	55.90	7.60	4.39	2.11	22.94	103	19	"	
	1000	on	0.5	35.5	56.22	7.55	4.46	2.44	23.13	71	29	yellowish	
	1005	on	0.5	38	57.00	7.52	4.41	2.21	23.20	50	22	"	
	1010	on	0.5	40.5	57.21	7.46	4.32	2.31	23.22	41	17	clear	

NZ

WELL DEVELOPMENT RECORD

WELL DESIGNATION: MW-06

DATE(S) OF INSTALLATION: 6/23/10

SITE GEOLOGIST: Tim Insuech

DATE(S) OF DEVELOPMENT: 6/26/10

STATIC WATER LEVELS: BEFORE DEVELOPMENT 23.65 Feet DATE 6/26/10
(FROM TOP OF CASING)

24 HRS. AFTER DEVEL. _____ DATE _____

DEPTH TO SEDIMENT: BEFORE DEVELOPMENT 28.10 Feet DATE 6/26/10
(FROM TOP OF CASING)

24 HRS. AFTER DEVEL. _____ DATE _____

DEPTH TO WELL BOTTOM: 29 Feet
(FROM TOP OF CASING)

QUANTITY OF MUD/WATER (gallons):

LOST DURING DRILLING _____

REMOVED PRIOR TO WELL INSERTION _____

LOST d/THICK FLUID DISPLACEMENT _____

ADDED d/FILTER PACK REPLACEMENT _____

(a) water column (ft.) 4.45 (b) well diameter (in.) 2.25

(c) screen length (ft.) 10 (d) borehole diameter (in.) 8.25

(e) annulus space/length (ft) 6

QUANTITY OF FLUID STANDING IN WELL 5.106 gallons

QUANTITY OF FLUID IN ANNULUS _____ gallons

TOTAL QTY. ³ (5 equivalent volumes) 15.32

TOTAL QTY. (5 times losses) _____

TOTAL
DEVEL.
VOLUME
REQ'D 15.32 gallons

TYPE AND SIZE OF PUMP: _____

TYPE AND SIZE OF BAILER: _____

DESCRIPTION OF SURGE TECHNIQUE, IF ANY: _____

TYPICAL PUMPING RATE 0.5 GAL/HR EST. RECHARGE RATE ³⁰
~~3.5~~ gal/hr
KNIS

TOTAL QUANTITY OF WATER REMOVED 22.5 gal TIME REQUIRED 45 min

SIGNATURE OF SITE GEOLOGIST Tim Insuech

37.3 x 11.4

$$.1632 \times 4.45 = 0.72624$$
$$\begin{array}{r} 4.6 \\ 5.106 \\ \hline 15.32 \\ \hline 15.32 \end{array}$$
Page 1 of 1[illegible]

APPENDIX D
LOW FLOW SAMPLING AND DATA SHEETS

LOW FLOW SAMPLING DATA SHEETS

[illegible]

•INDICATOR PARAMETERS HAVE STABILIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN: + 0.1 for pH; ± 3% for Specific Conductivity and Temperature; ± 10 mV for Redox Potential; and ± 10% for Dissolved Oxygen and Turbidity

LOW FLOW SAMPLING DATA SHEETS

Site: Date:	7/20/2010	Client /Site: Field	USACE/Bellfort Landfill
Weather:	Hot and Humid, Cloudy	Personnel: Job*	Tim Swavely and Greg Kochanowicz

Monitoring Well #:	MW-02R	Well Depth: Well	59.8	ft	Screened/Open Interval:	10	ft
Well Permit #:	NA	Diameter:	2	inches			

PID/FID Readings ppm):	0	Pump Intake Depth:	54.80	ft below TOC
Background: Beneath Outer Cap: Beneath	0	Depth to Water Before Pump Installation:	13.17	ft below TOC
Inner Cap:	0			

[illegible]

Comments: Sample MW-02R collected at 1400

• **INDICATOR PARAMETERS HAVE STABILIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN: + 0.1 for pH; ± 3% for Specific Conductivity and Temperature; ± 10 mV for Redox Potential; and ± 10% for Dissolved Oxygen and Turbidity**

LOW FLOW SAMPLING DATA SHEETS

[illegible]

• **INDICATOR PARAMETERS HAVE STABILIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN: + 0.1 for pH; ± 3% for Specific Conductivity and Temperature; ± 10 mV for Redox Potential; and ± 10% for Dissolved Oxygen and Turbidity**

LOW FLOW SAMPLING DATA SHEETS

[illegible]

•INDICATOR PARAMETERS HAVE STABILIZED WHEN 3 CONSECUTIVE READINGS ARE WITHIN: + 0.1 for pH; ± 3% for Specific Conductivity and Temperature; ± 10 mV for Redox Potential; and ± 10% for Dissolved Oxygen and Turbidity

APPENDIX E
ANALYTICAL LAB REPORTS (CD)

APPENDIX F
SOIL AND GROUNDWATER DATA
VALIDATION REPORTS

DATA VALIDATION REPORT
PHASE II ENVIRONMENTAL SITE ASSESSMENT
BELLFORT STREET LANDFILL
HOUSTON, TEXAS
TEST AMERICA JOB NUMBER: 280-5524-1

This validation report presents the findings of a quality assurance review of the analytical data generated for ground water samples collected at the Bellfort Street Landfill site. The samples were collected 20 July 2010 and submitted to TestAmerica Laboratories, Inc. (TA) of Denver, Colorado.

The sample specific analysis performed included volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals (total and dissolved). The analyses were performed in accordance with the protocols presented in *Test Methods for Evaluating Solid Waste, USEPA SW-846, Third Edition, November 1986 and its updates*. Specific method references are as follows:

<u>Analysis</u>	<u>Method References</u>
VOCs	USEPA SW-846 Method 8260B
SVOCs	USEPA SW-846 Method 8270C
Metals	USEPA SW-846 Methods 6010C and 7470A

The samples included in the referenced TA job number are as follows:

MW-2R	MW-4R
MW-6	MW-7
MW-01-QC	
(Blind field duplicate of sample MW-7)	

Data Validation Summary

The findings offered in this report are based on a comprehensive review of the data for all samples. The data have been validated and qualified according to the protocols and quality control (QC) requirements of the analytical methods, the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-99/008, October 1999*, the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, USEPA-540-R-10-011, January 2010*, and the reviewer's professional judgment.

The review was based on an evaluation of the following criteria, reported according to the CLP-equivalent deliverables format: chain of custody documentation; sample preservation; holding times; laboratory method blanks; trip blanks; instrument calibration blanks; bromofluorobenzene (BFB) and decafluorotriphenylphosphine (DFTPP) mass tuning results; initial and continuing calibration data; low-level check standards; Inductively Coupled Plasma (ICP) interference check sample results; internal standard performance; laboratory control sample (LCS) results; matrix spike/matrix spike duplicate (MS/MSD) recoveries and reproducibility; post-digestion spike recoveries; serial dilution results; field duplicate precision; and the quantitation of sample results.

Field duplicate precision was evaluated by comparison of the analytical results for the duplicate samples and calculation of the relative percent difference (RPD) for the analytical results. The field duplicate precision RPD criterion was 20% for VOCs and 25% for SVOCs and metals. A QC limit equal to 2X the Limit of Quantitation (LOQ) was used for field duplicate results at concentrations less than 5X the LOQ.

Data validation qualifiers, consistent with the referenced validation guidance, were added to the electronic data deliverable (EDD) provided with the laboratory data report. The "U" qualifier was applied to all results for which the compound/analyte was analyzed for but not detected above the Limit of Quantitation (LOQ) or when a positive result has been negated due to blank contamination. The "J" qualifier was applied to all positive results below the LOQ and to all reported values or "non-detect" LOQs that were quantitatively estimated because of QC criteria exceedances. The "J-" qualifier was applied to all metals results that were considered biased low quantitative estimates. Those "non-detect" results that were rejected due to lack of a recovery with the MS/MSD analysis were marked as "R" in the EDD.

Data Validation Results

General Comments

All of the referenced samples were received by the laboratory in acceptable condition. Two trip blank samples were received at the laboratory but were not listed on the chain of custody. Both of these trip blank samples were analyzed for VOCs.

All VOC and metals samples were prepared and analyzed within the method required holding time. There were two sets of results reported for the SVOC analysis as the method blank associated with the original preparation batch had a surrogate recovery that was below the QC limit. Comparable results were obtained with both analyses, and all results for SVOCs were reported from the initial sample extraction which was performed within the prescribed holding times. Low concentrations of target compounds/analytes were detected in associated blanks, and affected sample results were negated. All surrogate recoveries for investigative samples were within QC limits. Some VOCs exhibited low relative response factors with initial and continuing calibrations, and results for these VOCs were qualified. Recoveries for all calibration verification standards and post-digestion spikes were acceptable. Results for all serial dilution analyses samples were within QC limits. Results for two metals (total) and one SVOC were qualified on the basis of field duplicate precision. Low recoveries were obtained for one metal with the MS/MSD analysis and certain SVOCs in the LCS, and the positive results or "non-detect" LOQs for these compounds/analyte were qualified. Additionally, the MS/MSD analysis for the SVOC fraction yielded no recovery for one compound and poor precision for another compound. Results for the compound yielding no MS/MSD recovery were rejected in the unspiked sample, while all positive results for the SVOC exhibiting poor MS/MSD precision were qualified as estimated.

Qualifications

All positive results reported at concentrations below the LOQ were qualified “J” to indicate that they are quantitative estimates.

The positive results for the VOCs and SVOCs summarized in the following table are considered qualitatively invalid since these compounds were also detected in associated trip blanks or method blanks. For common laboratory contaminants, like acetone, methylene chloride, and the phthalate esters, results are negated and qualified “U” if they are less than 10X the associated blank concentration. Sample concentrations greater than the LOQ and less than the blank qualification level are reported as less than the sample concentration in the EDD. Sample concentrations less than both the LOQ and the qualification level are reported as less than the LOQ in the EDD.

VOCs and SVOCs Qualified for Blank Contamination	Associated Samples
Acetone	MW-6 and MW-7
Methylene Chloride	All Investigative Samples
Bis-(2-ethylhexyl) phthalate	All Investigative Samples

The positive results for total or dissolved metals summarized in the following table are considered qualitatively invalid since they were also detected in associated instrument or method blanks at similar concentrations. The associated sample results have been negated and qualified “U” and are reported as less than the LOQ in the EDD.

Metals Qualified for Blank Contamination	Associated Samples
Cadmium (Total)	MW-01-QC, MW-2R, MW-4R, and MW-7
Chromium (Total)	MW-2R, MW-4R, and MW-6
Antimony (Dissolved)	MW-01-QC
Nickel (Dissolved)	MW-6

The initial and/or continuing calibration relative response factors (RRFs) for the VOCs acetone, 2-butanone, and methyl acetate were below the lower QC limit of 0.05. These low RRFs are an indication of reduced method sensitivity for these compounds, and the non-detect LOQs for acetone, 2-butanone, and methyl acetate in all investigative samples have been qualified “UJ” in the EDD to indicate that they are estimated.

The Laboratory Control Sample associated with the SVOC analysis yielded recoveries for acenaphthene, acenaphthylene, hexachlorobutadiene, hexachloroethane, 2-chloronaphthalene, 4-chlorophenyl phenyl ether, dibenzofuran, benzo(a)pyrene, 2-methylnaphthalene, naphthalene, and hexachlorocyclopentadiene that were below the lower QC limits. These low recoveries are an indication of a low bias with the measurement of these compounds in the associated samples, and the “non-detect” LOQs for these compounds in all samples were qualified “UJ” in the EDD to indicate that they are quantitative estimates that may be biased low. The possibility of elevated LOQs should be noted when assessing the “non-detect” results for the referenced SVOCs in all samples.

The MS/MSD analysis of sample MW-7 for SVOCs yielded no recovery for 3,3'-dichlorobenzidine. This extremely poor performance for this compound with the SVOC analysis of sample MW-7 is an

indication of a severe matrix interference, and the “non-detect” results for 3,3’-dichlorobenzidine in sample MW-7 and its field duplicate, MW-01-QC, have been rejected.

The MS/MSD analysis of sample MW-7 for SVOCs yielded inconsistent performance for caprolactam, which was detected at a concentration of 210 ug/L in the unspiked sample but was not detected in the MS/MSD sample (caprolactam was not a spiked compound with the SVOC MS/MSD analysis). These inconsistent results are an indication of a non-homogeneous sample and/or inconsistent method performance, and the positive results for caprolactam in all samples have been marked with “J” qualifiers in the EDD to indicate that they are quantitative estimates.

The MS/MSD analysis of sample MW-7 for total metals yielded recoveries for antimony that were below the lower QC limit. These low recoveries are an indication of a matrix interference with the analysis for total antimony in the associated samples, and the “non-detect” LOQs for this analyte in all samples were qualified “UJ” in the EDD to indicate that they are quantitative estimates that may be biased low. The possibility of elevated LOQs should be noted when assessing the “non-detect” results for total antimony in all samples.

Sample MW-7 and its blind field duplicate sample, MW-01-QC, were submitted to the laboratory to evaluate sampling and analytical precision for the project. All results reported for this field duplicate pair were within the project QC limits, with the exception of di-n-butyl phthalate, total aluminum, and total iron. The poor field duplicate precision for these compounds/analytes is likely attributable to matrix interference and their results should be considered estimated. This has been indicated by marking the positive results for di-n-butyl phthalate in the field duplicate pair with “J” qualifiers in the EDD and the positive results for total aluminum and total iron in all samples with “J” qualifiers in the EDD.

Conclusion

This report presents the findings of the validation of the specified data, which is associated with the analysis of samples collected at Bellfort Street Landfill site and reported in the referenced TA job number. The data validation included a review of the data deliverables described in the Data Validation Summary portion of this report. The following data validation qualifiers were applied as appropriate:

U – The compound/analyte was analyzed for but not detected above the LOQ, or the positive result has been negated due to blank contamination.

UJ – The compound was not detected and the reported LOQ should be considered a biased low quantitative estimate.

J – The reported value was quantitatively estimated because of a QC exceedance or because the concentration was below the LOQ.

J- – The reported value should be considered a biased low quantitative estimate.

R – The “non-detect” result for this compound was rejected.

The laboratory analyses were performed acceptably for the referenced sample results, with the exception of the rejected results for 3,3-dichlorobenzidine described in the report. In summary, all results that were not rejected are valid and useable with qualifications as presented in the validation report.

In the event that you have questions or require additional information, please feel free to contact me at 610-329-1307.

Regards



Joseph M. Loeper, Ph.D.
Senior Quality Assurance Chemist

13 September 2010

Dated

DATA VALIDATION REPORT
PHASE II ENVIRONMENTAL SITE ASSESSMENT
BELLFORT STREET LANDFILL
HOUSTON, TEXAS
TEST AMERICA JOB NUMBER: 280-4896-1

This validation report presents the findings of a quality assurance review of the analytical data generated for soil samples collected at the Bellfort Street Landfill site. The samples were collected 26 June 2010 and submitted to TestAmerica Laboratories, Inc. (TA) of Denver, Colorado. All samples were analyzed for RCRA metals in accordance with “*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition, November 1986 and its Updates, SW-846 Methods 6010C and 7471B*”.

The samples included in the referenced TA job number are as follows:

SS-01	SS-02
SS-03	SS-04
SS-05	SS-06
SS-07	SS-08
SS-09	SS-10
SS-062610-QC	
(Blind field duplicate of sample SS-04)	

Data Validation Summary

The findings offered in this report are based on a comprehensive review of the data for all samples. The data have been validated and qualified according to the protocols and quality control (QC) requirements of the analytical method, the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, USEPA-540-R-10-011, January 2010*, and the reviewer’s professional judgment.

The review was based on an evaluation of the following criteria, reported according to the CLP-equivalent deliverables format: chain of custody documentation; sample preservation; holding times; laboratory method blanks; instrument calibration blanks; initial and continuing calibration data; low-level check standards; Inductively Coupled Plasma (ICP) interference check sample results; laboratory control sample (LCS) results; matrix spike/matrix spike duplicate recoveries and reproducibility; post-digestion spike recoveries; serial dilution results; field duplicate precision; and the quantitation of sample results.

Field duplicate precision was evaluated by comparison of the analytical results for the duplicate samples and calculation of the relative percent difference (RPD) for the analytical results. The field duplicate precision RPD criterion for all analyses was 40%. A QC limit equal to 3X the Reporting Limit (RL) was used for field duplicate results at concentrations less than 5X the RL.

Data validation qualifiers, consistent with the referenced validation guidance, were added to the electronic data deliverable (EDD) provided with the laboratory data report. The "U" qualifier was applied to all results in which the compound was analyzed for, but not detected above the Limit of Quantitation (LOQ) or when a positive result has been negated due to blank contamination. The "J" qualifier was applied to all positive results below the LOQ and to all reported values or "non-detect" LOQs that were quantitatively estimated because of QC criteria exceedances. The "J-" qualifier was applied to all results that were considered biased low quantitative estimates.

Data Validation Results

General Comments

Minor labeling discrepancies were identified by the laboratory. These discrepancies were resolved via e-mail communication with sampling personnel. There was insufficient ice in the sample cooler to maintain the samples at the prescribed temperature of $\leq 6^{\circ}\text{C}$, and the positive results or "non-detect" LOQs for mercury have been qualified.

All sample analyses were performed within the method required holding time. Low concentrations of target analytes were detected in the method blank and calibration blanks, and associated results for one analyte were negated. Recoveries for all calibration verification standards, LCSs, and post-digestion spikes were acceptable. Results for all serial dilution analyses samples were within QC limits. A low recovery was obtained for one analyte with the MS/MSD analysis, and the positive results for this analyte were qualified.

Sample SS-04 and its blind field duplicate, SS-062610-QC, were submitted to the laboratory to evaluate sampling and analytical precision for the project. Acceptable field duplicate precision was observed for all results reported for this field duplicate pair.

Qualifications

All samples were received at the laboratory at a temperature of 17°C . Mercury in soil samples that are not maintained under appropriate temperature conditions may be subject to losses, and the positive results or "non-detect" LOQs for mercury in all samples have been qualified "J-" or "UJ", respectively, to indicate that they are estimated and potentially biased low. The possibility of elevated LOQs should be noted when assessing the "non-detect" results for mercury in these samples.

All positive results reported at concentrations below the LOQ were qualified "J" to indicate that they are quantitative estimates.

The positive results reported for silver in samples SS-01, SS-02, SS-03, SS-07, and SS-08 are considered qualitatively invalid since similar concentrations of this analyte were detected in associated calibration blanks. The referenced sample results for silver have been negated and qualified "U" and are reported as less than the LOQ in the EDD.

The MS/MSD analysis of sample SS-02 yielded recoveries for lead that were below the lower QC limit of 75%. These low recoveries are an indication of a matrix interference with the analysis for lead in the associated samples, and the positive results for this analyte in all samples were qualified "J" to

indicate that they are quantitative estimates. A bias was not assigned to these results since the post-digestion spike recoveries for this analyte were within acceptance limits.

Conclusion

This report presents the findings of the validation of the specified data, which is associated with the analysis of samples collected at Bellfort Street Landfill site and reported in the referenced TA job number. The data validation included a review of the data deliverables described in the Data Validation Summary portion of this report. The following data validation qualifiers were applied as appropriate:

U – The target metal was analyzed for but not detected above the LOQ, or the positive result has been negated due to blank contamination.

UJ – The compound was not detected and the LOQL should be considered a biased low quantitative estimate.

J – The reported value was quantitatively estimated because of a QC exceedance or because the concentration was below the LOQ.

J- – The reported value should be considered a biased low quantitative estimate.

In summary, the laboratory analyses were performed acceptably for the referenced sample results, and are valid and useable with qualifications as described in the validation report.

In the event that you have questions or require additional information, please feel free to contact me at 610-329-1307.

Regards



Joseph M. Loeper, Ph.D.
Senior Quality Assurance Chemist

25 August 2010

Dated